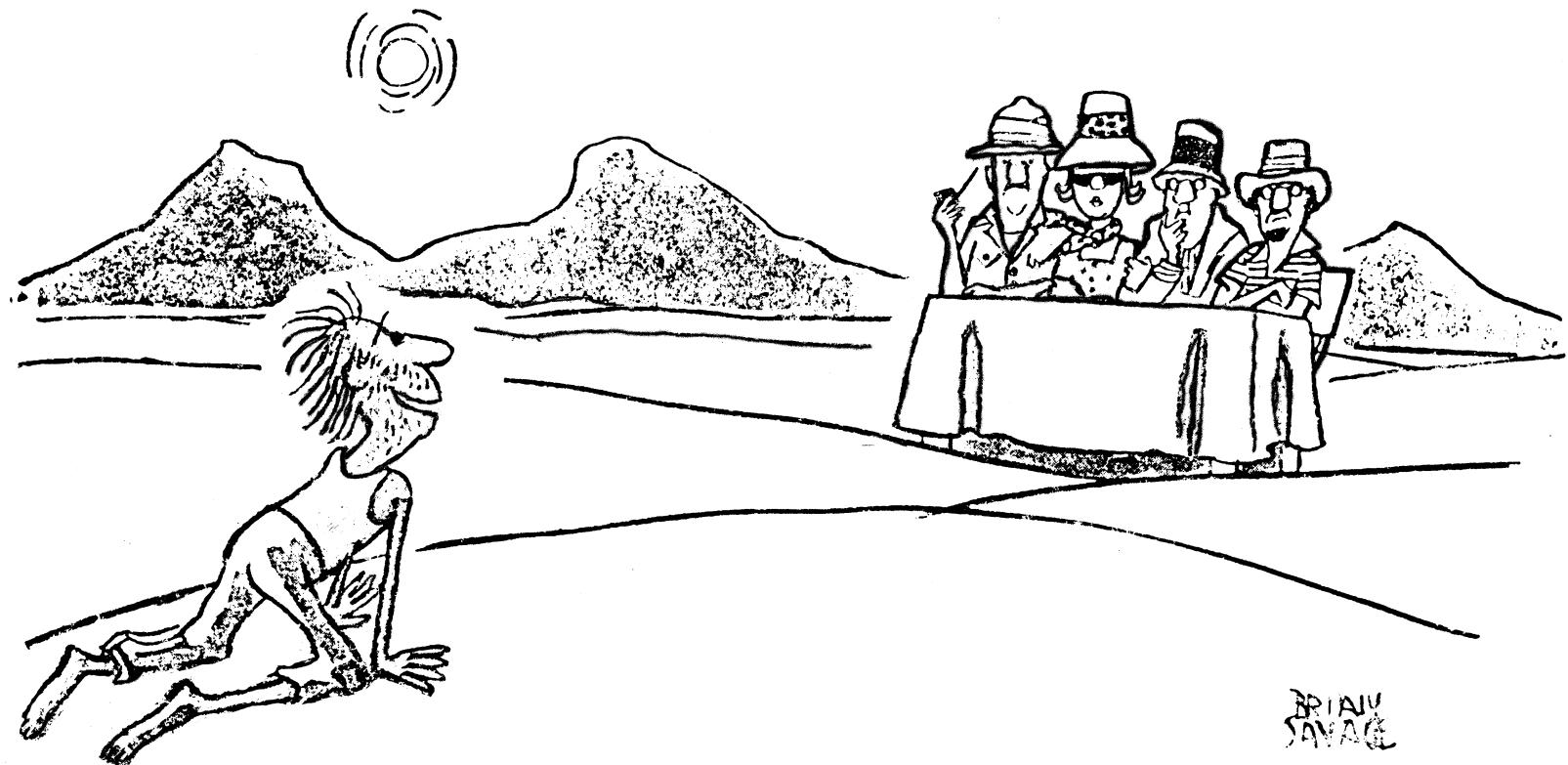


# Witness To A Natural Convergence:

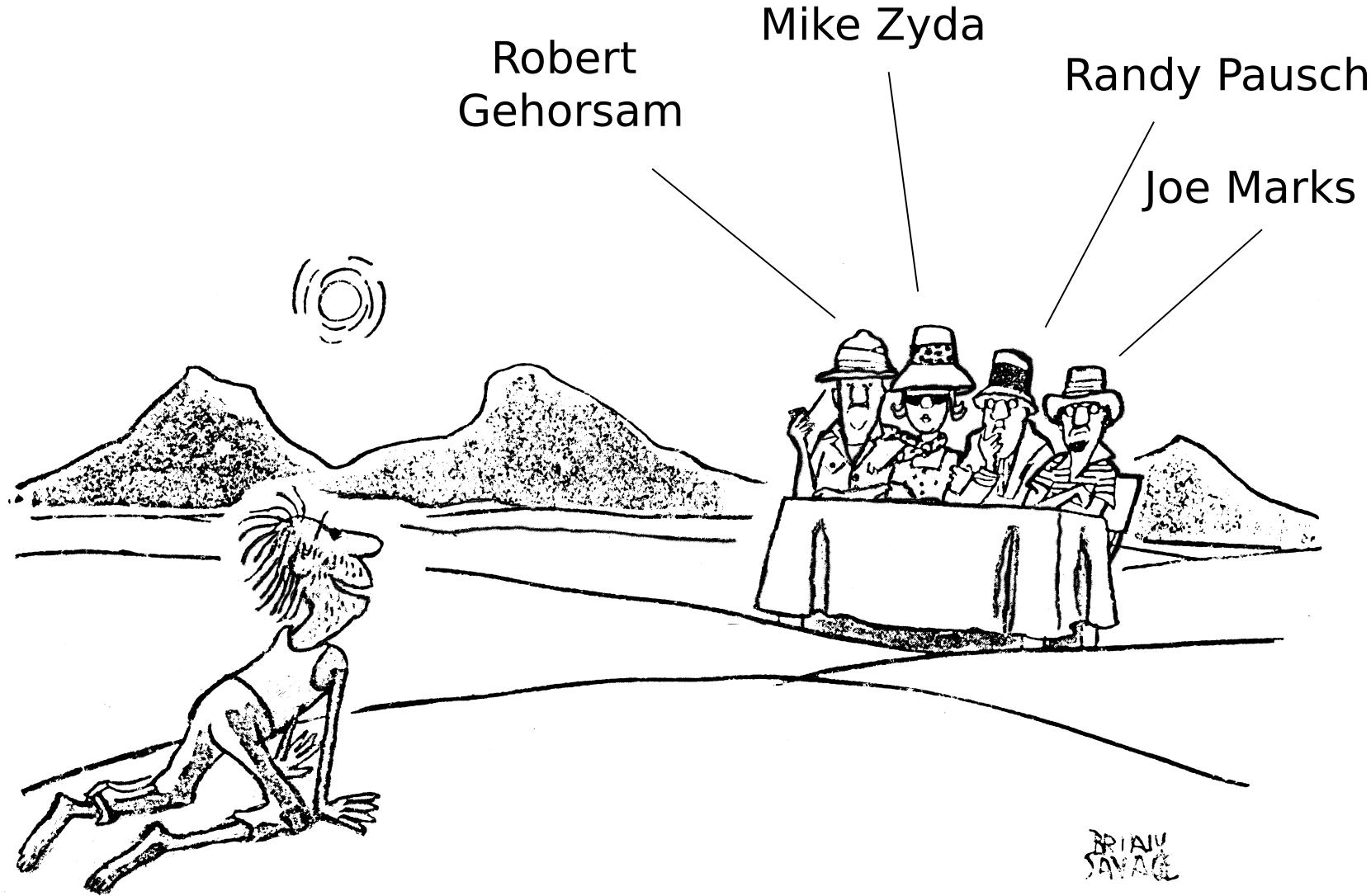
Distributed Simulation  
Interactive Gaming  
Persistent Worlds  
Command  
Control  
Future Ops

What's Next?

Jack Thorpe, Ph.D., Colonel USAF (ret)  
Jack@thorpe.net



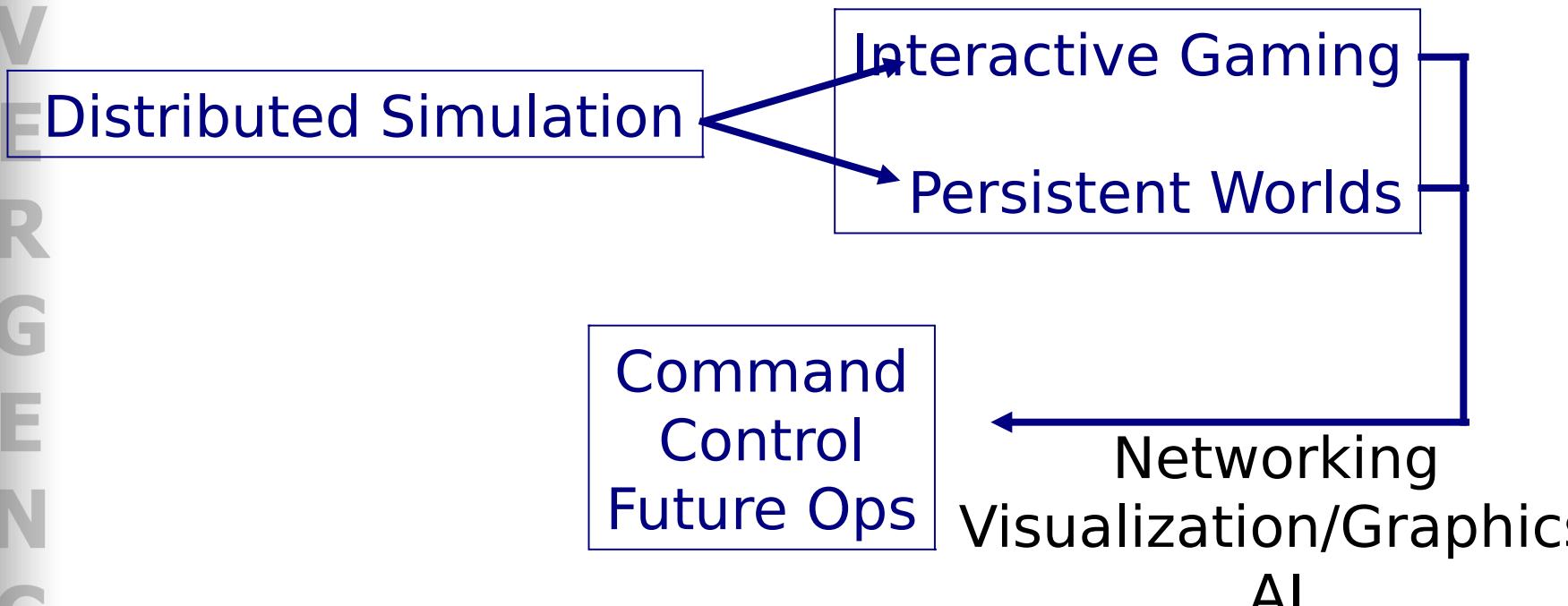
**"Thank God! A panel of experts!"**



**"Thank God! A panel of experts!"**

## Thesis:

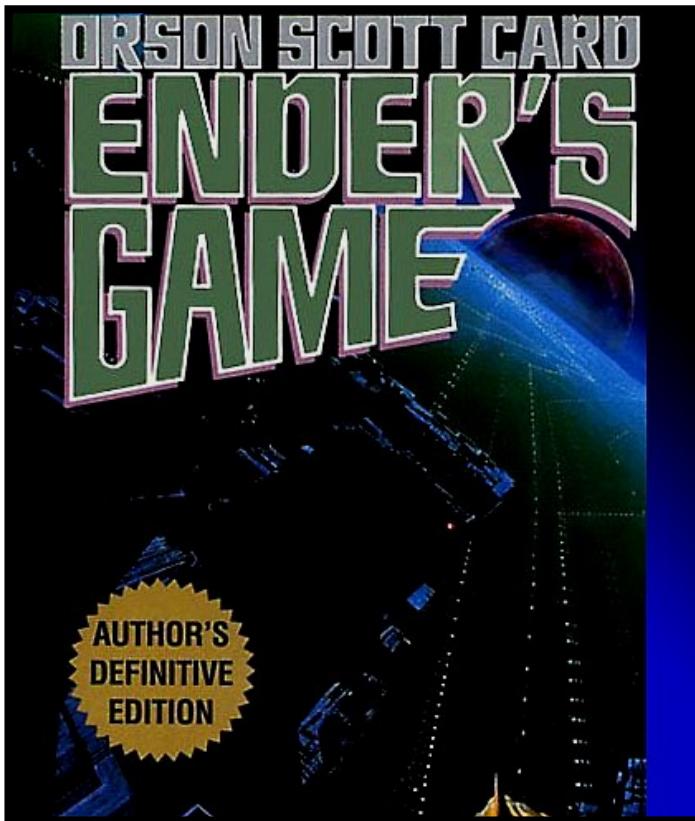
There is a convergence ongoing of several key information-based technologies, applications, and domains.



---

Common Information Technology Infrastructure

CCC  
000  
NNN  
VVV  
EEE  
RRR  
GGG  
EEE  
NNN  
CCC  
EEE



Has Ender's Game been on  
your reading list yet?



Who's the fighter pilot?







# Doesn't read the manual

Jumps right in -  
Fearless!

Expects the  
system to be  
designed  
intuitively

If it is not obvious,  
goodbye



Opens own www site

When stuck:

- FAQ
- Online chat
- 24x7 reference
- Online, on call  
mentors

Shares solutions  
with others

Explores,  
experiments,  
pushes the limits,  
hacks the system

Discovers  
previously  
unknown  
capabilities

When motivated,  
will have a voracious  
appetite for more Information

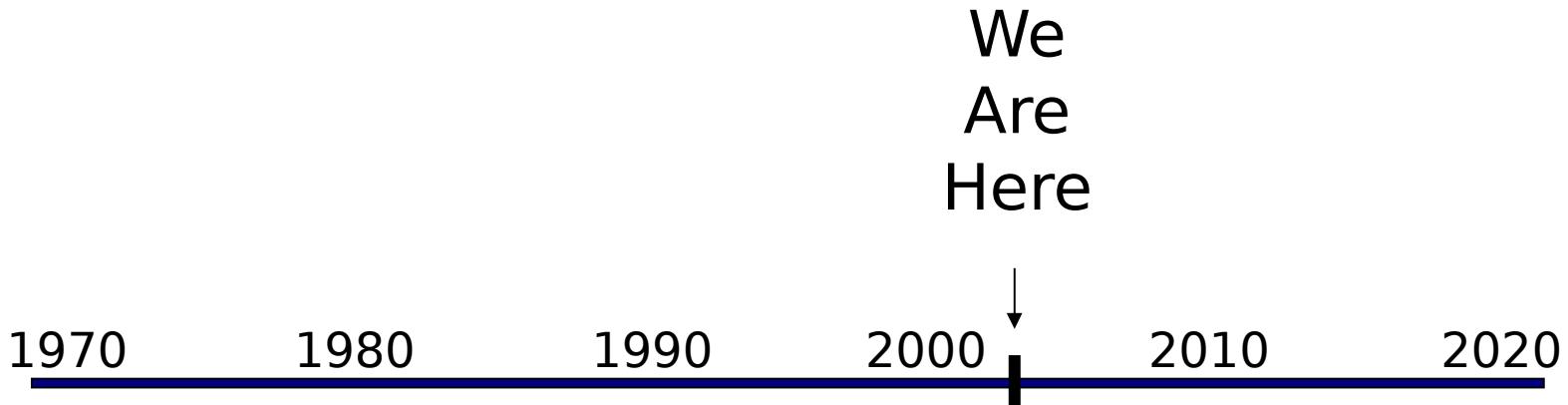


Student who  
need to be  
trained?

OR

Autodidact  
who is ready,  
willing, and  
able to teach  
himself/herself

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E



A few anchors

We  
Are  
Here

Military  
Operations

Technologies

Popular  
Culture

# Evacuation of Saigon

Military  
Operations

1970 1980 1990 2000 2010 2020

Evacuation  
of Saigon

Beirut

Military  
Operations

1970

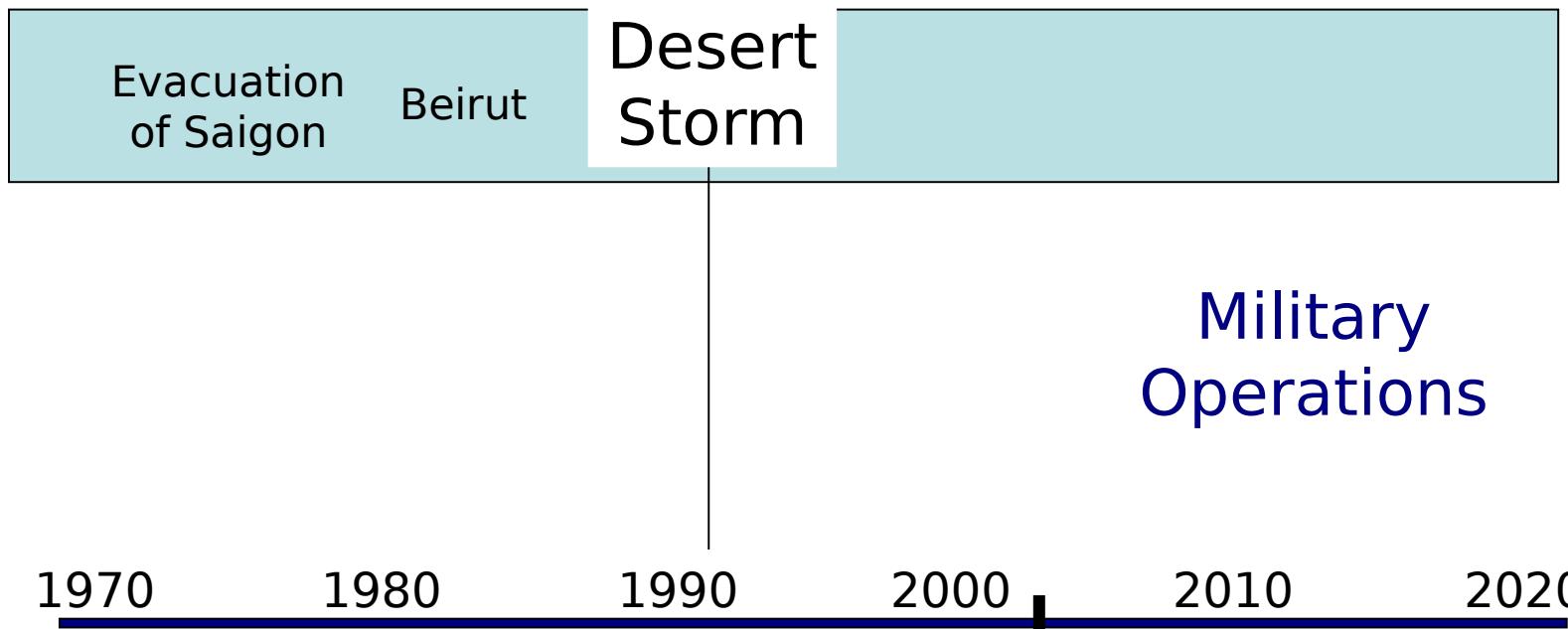
1980

1990

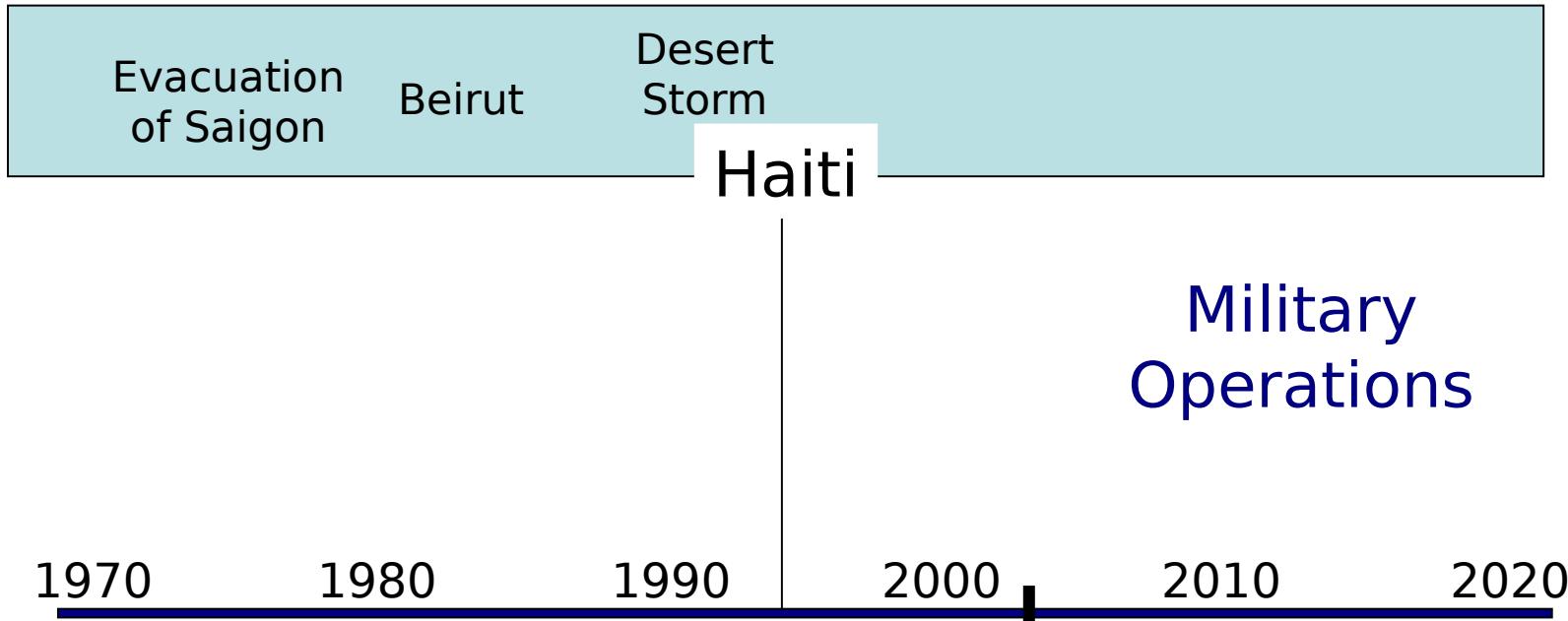
2000

2010

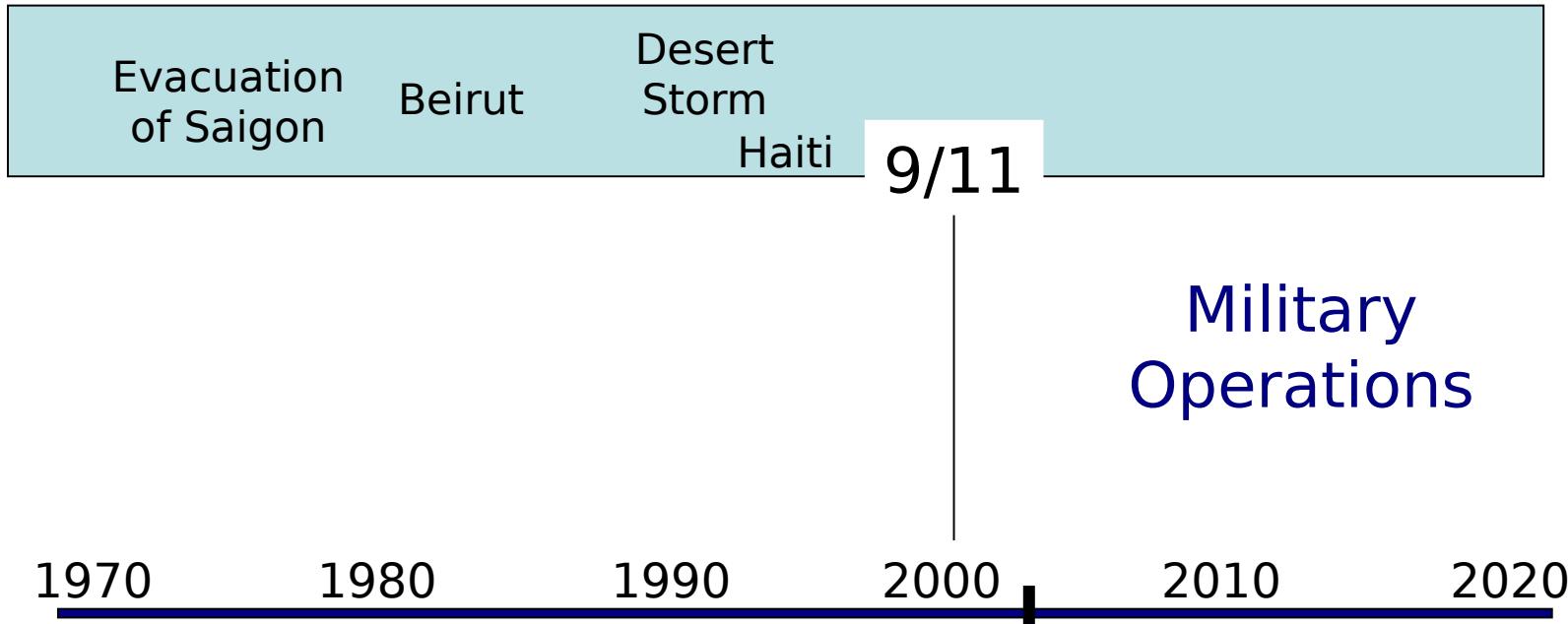
2020

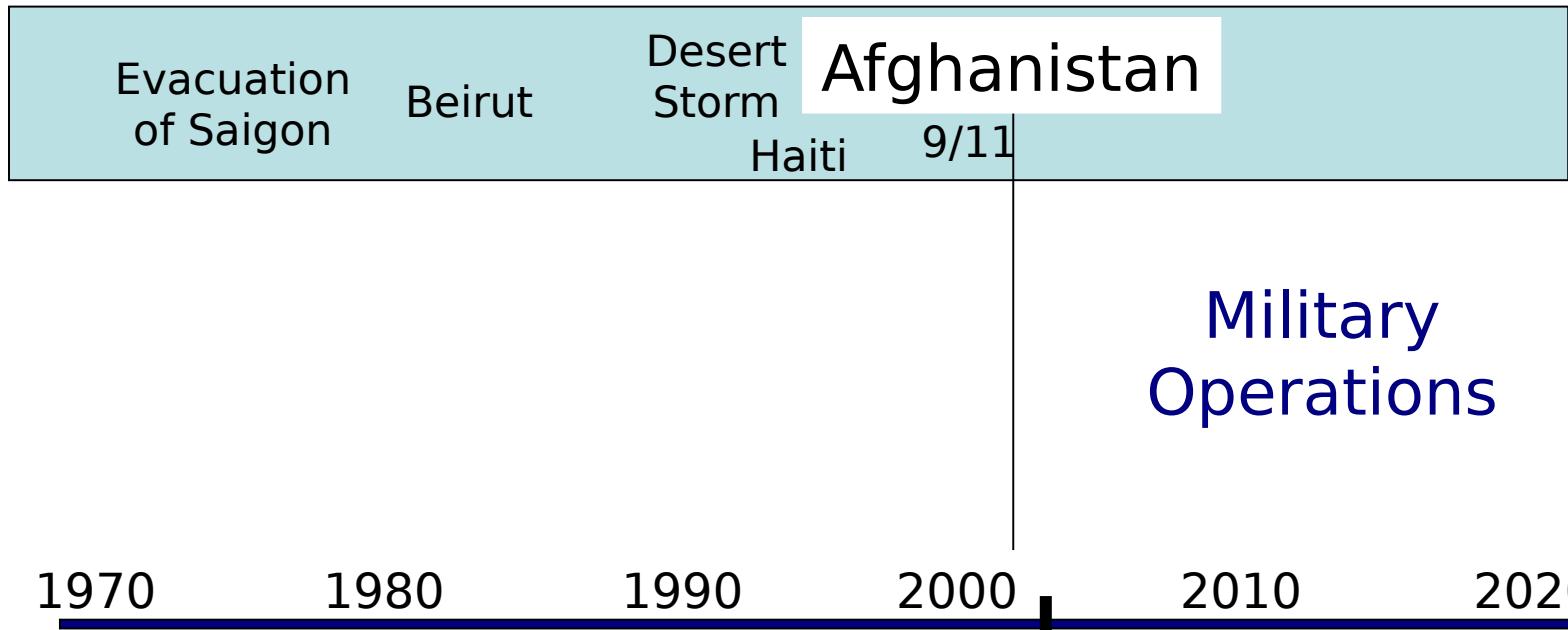


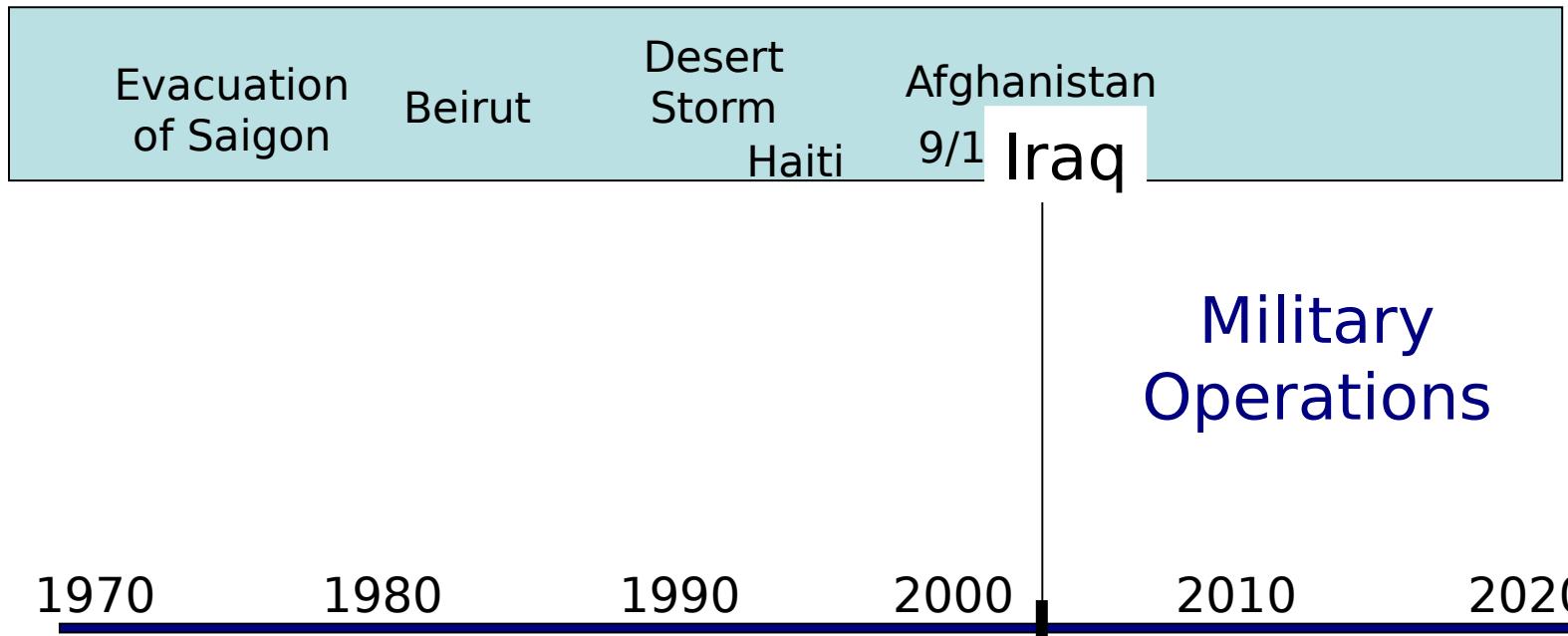
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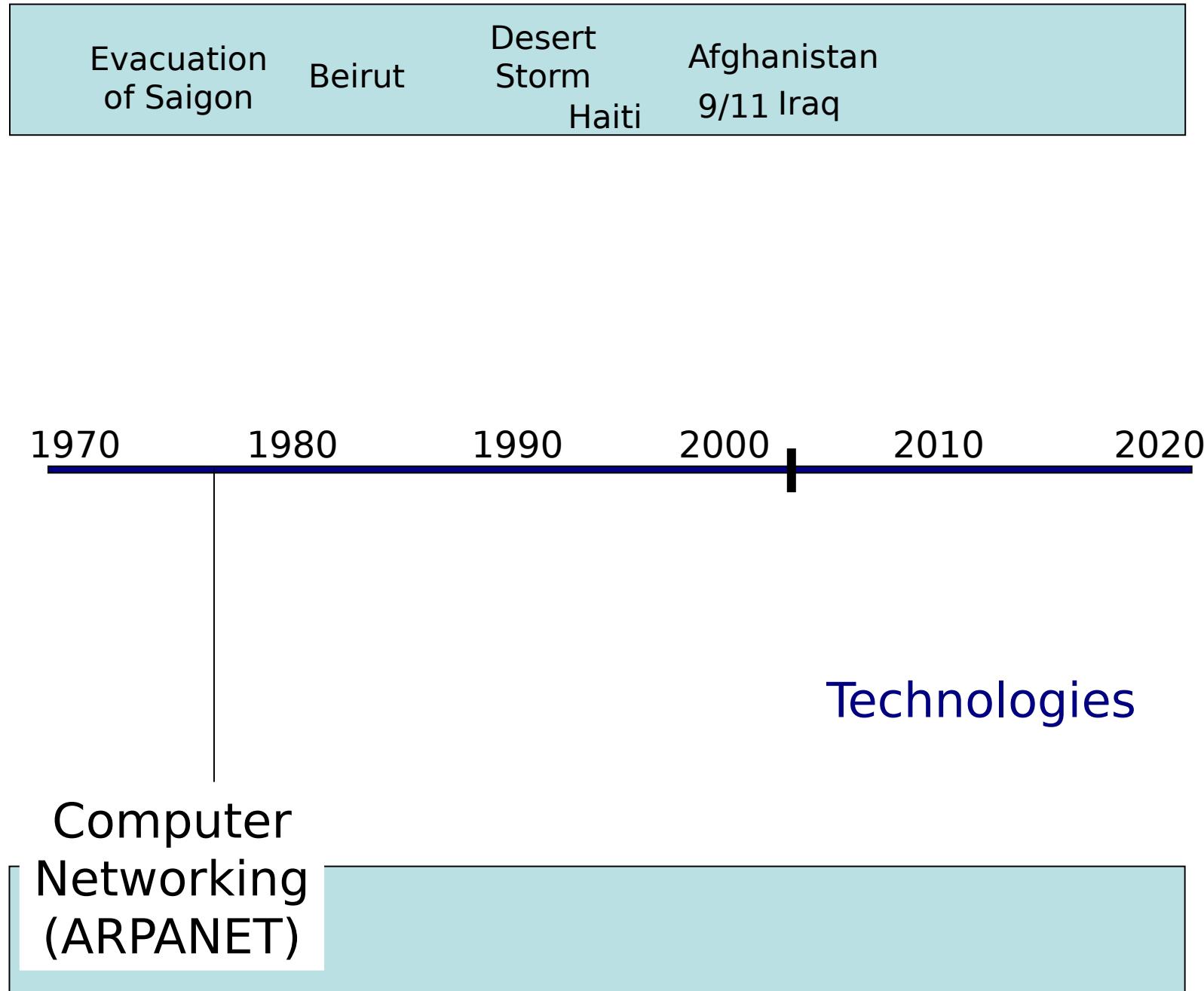
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E E E



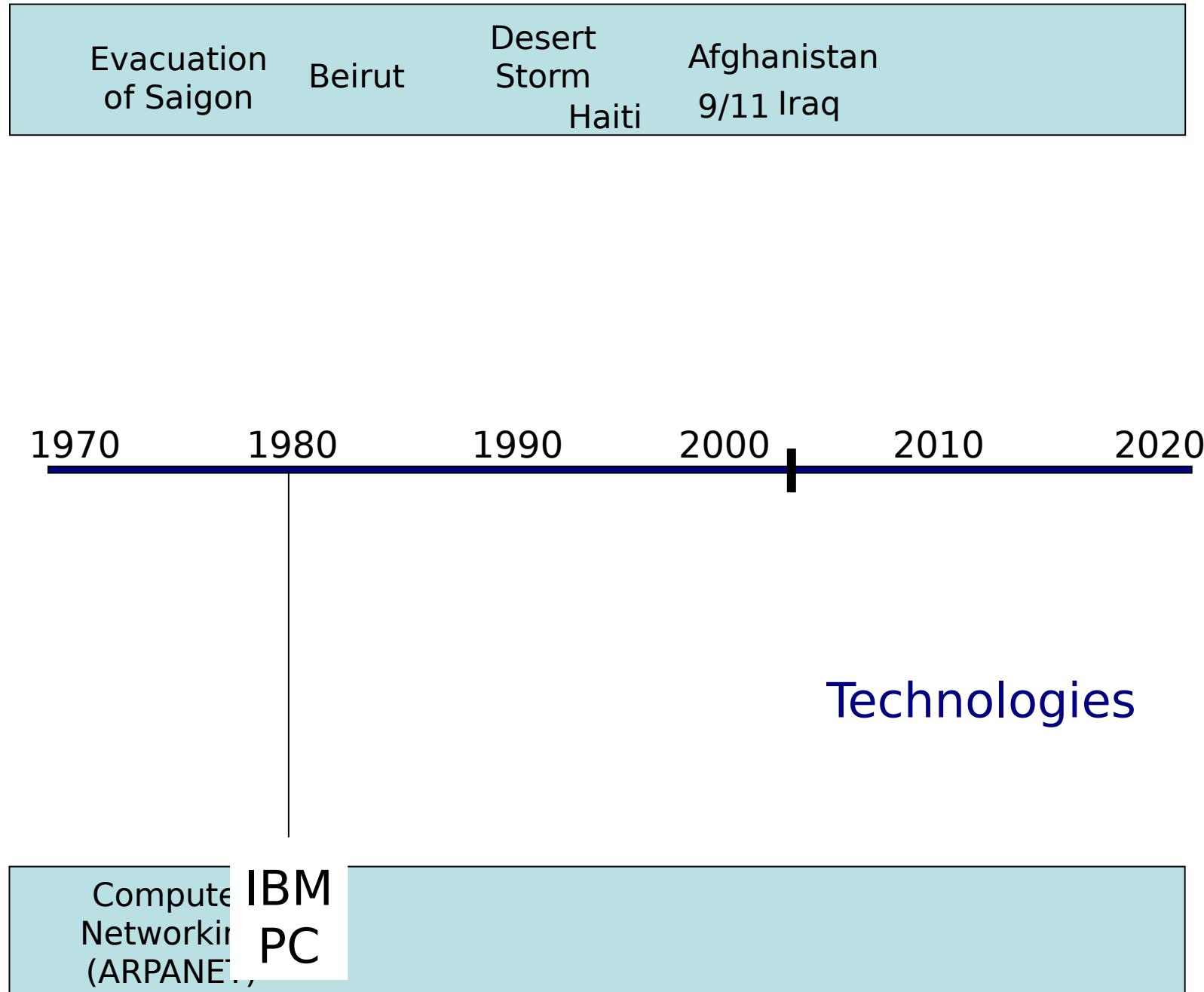




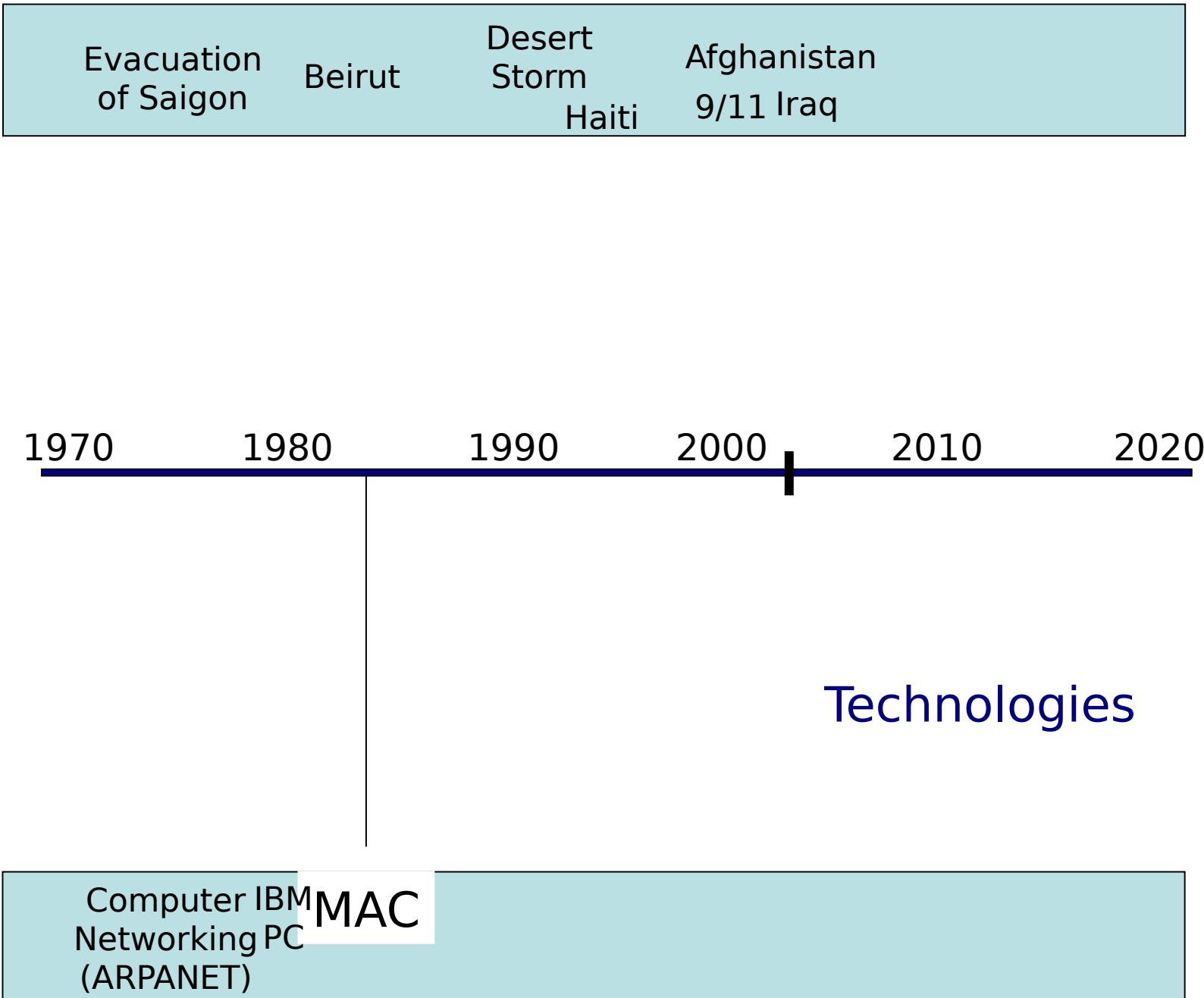
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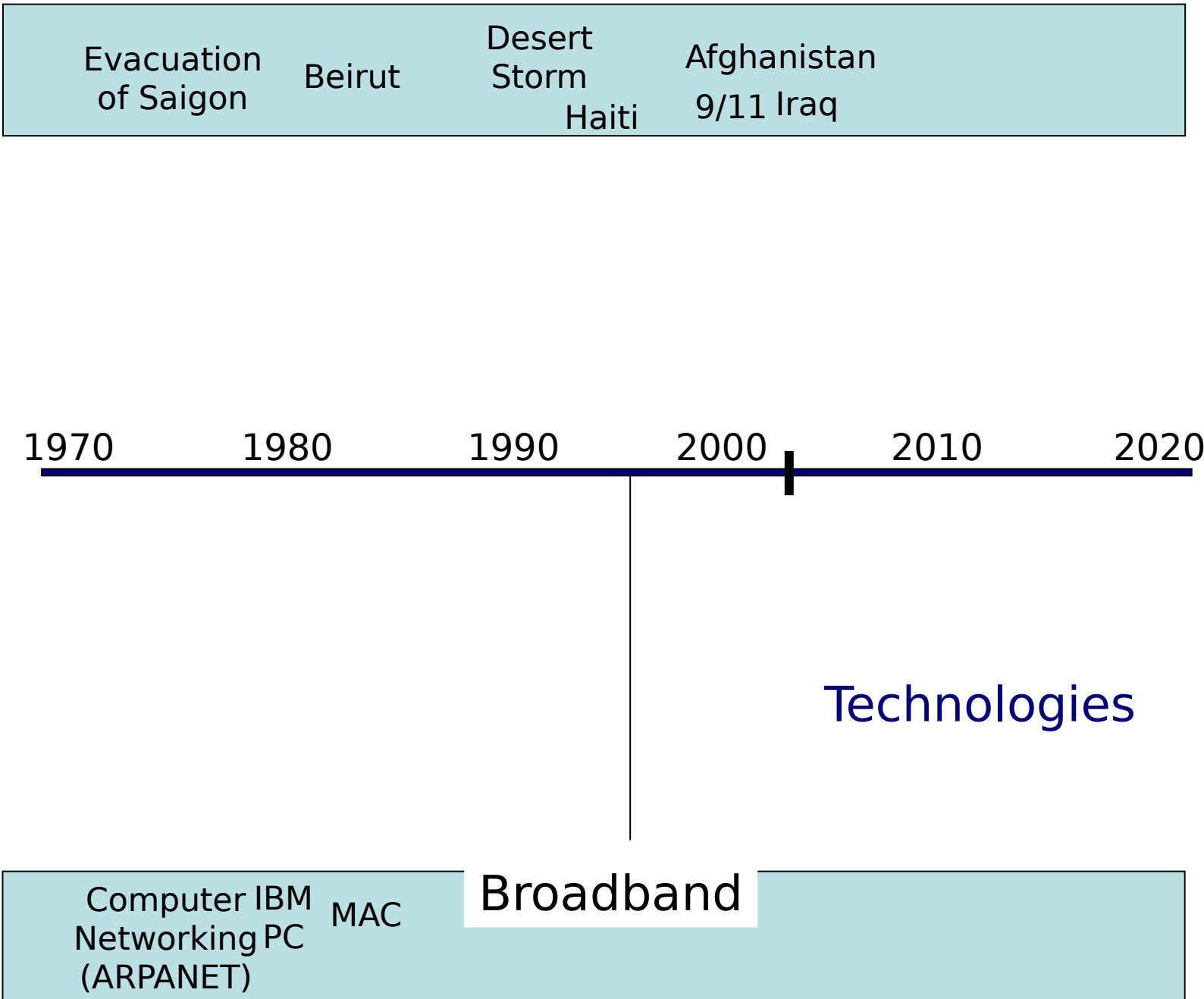
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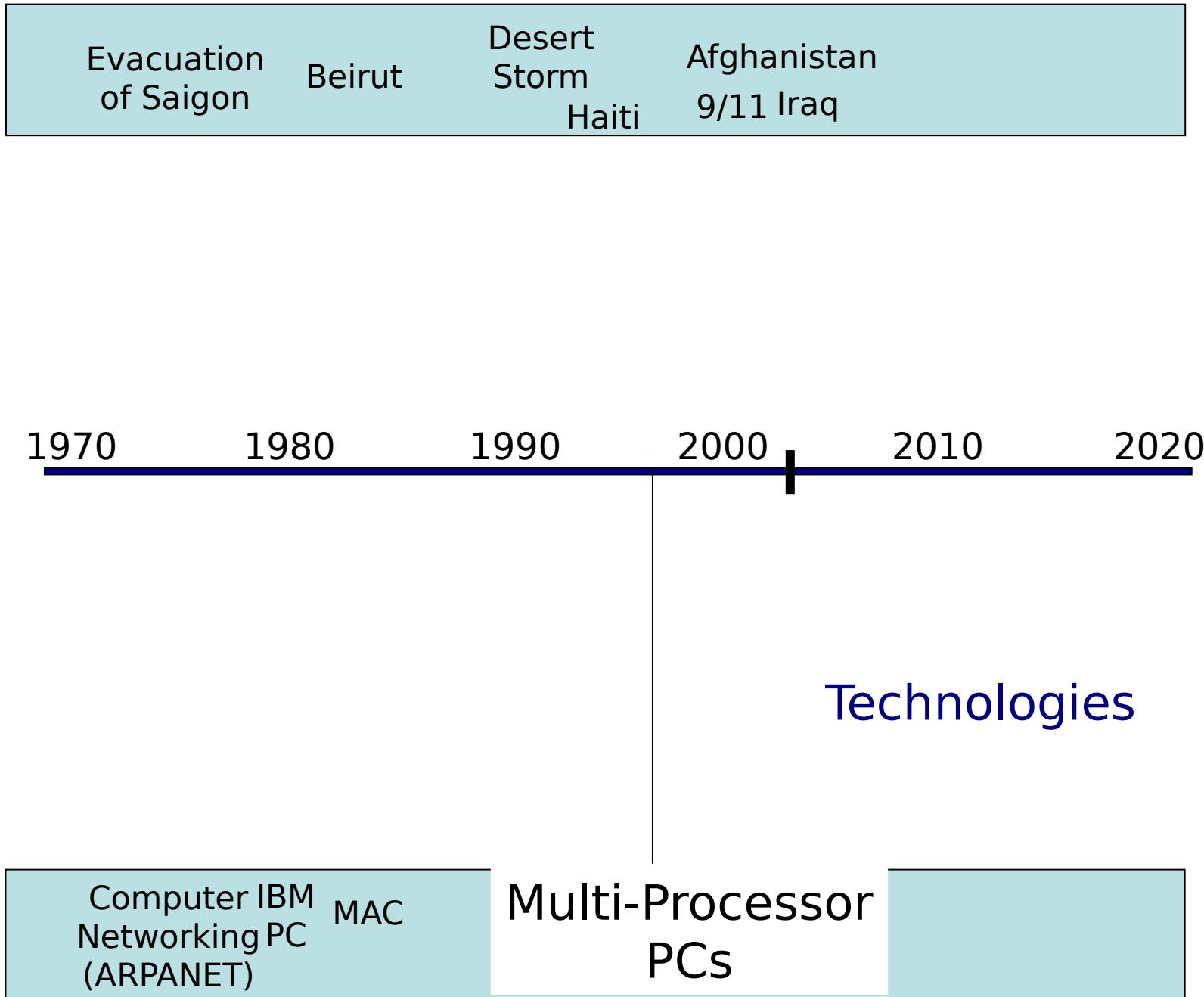
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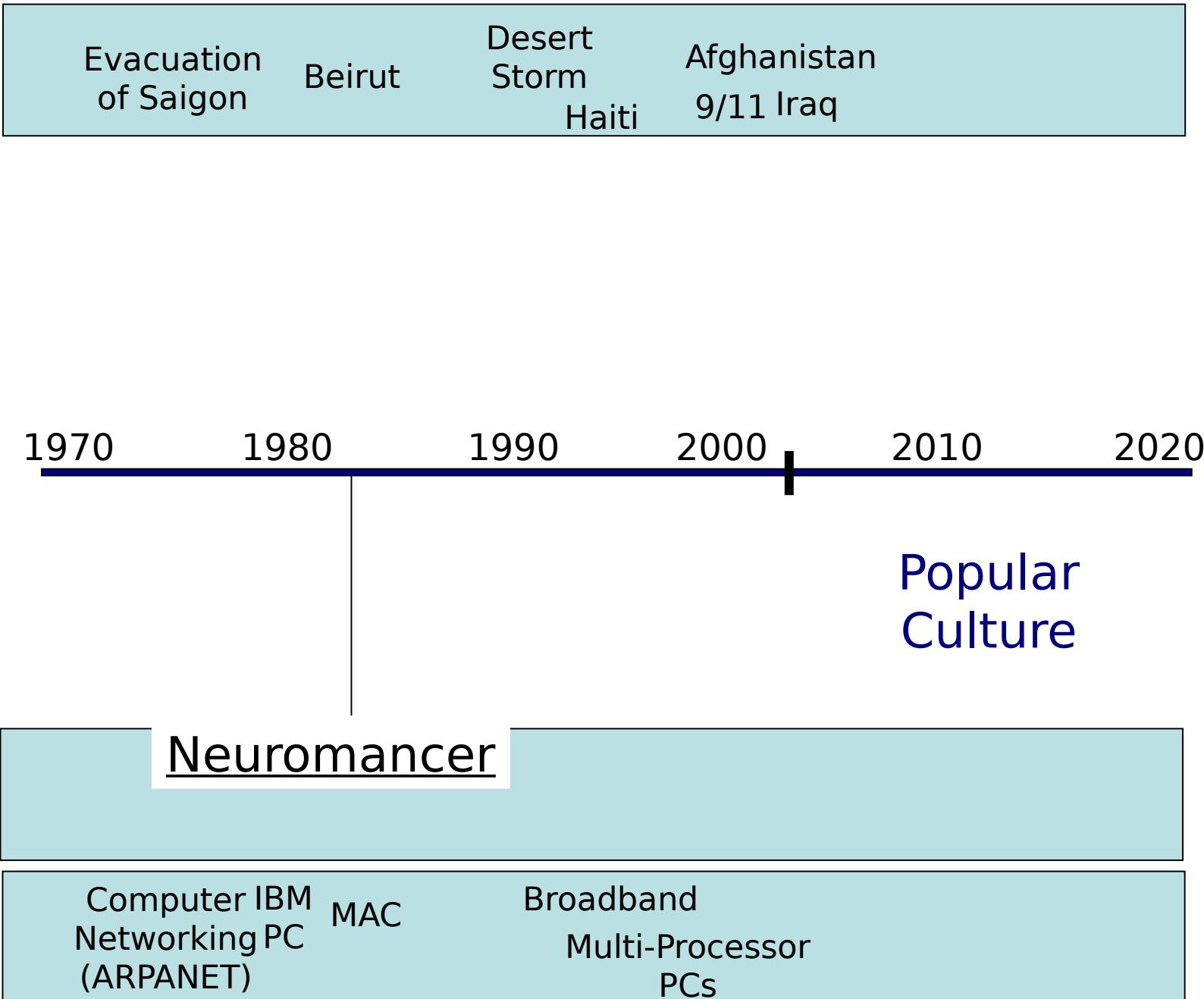
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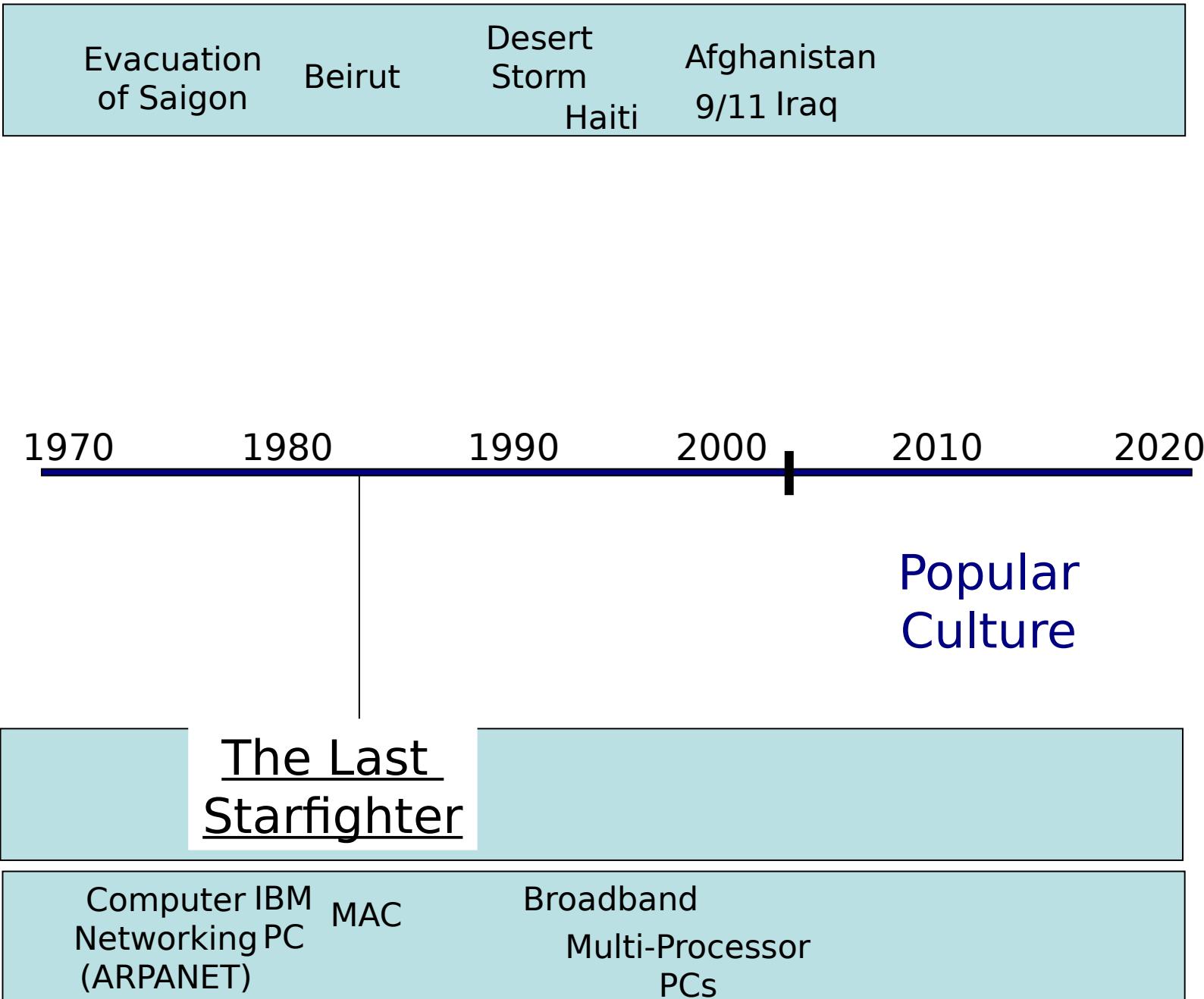
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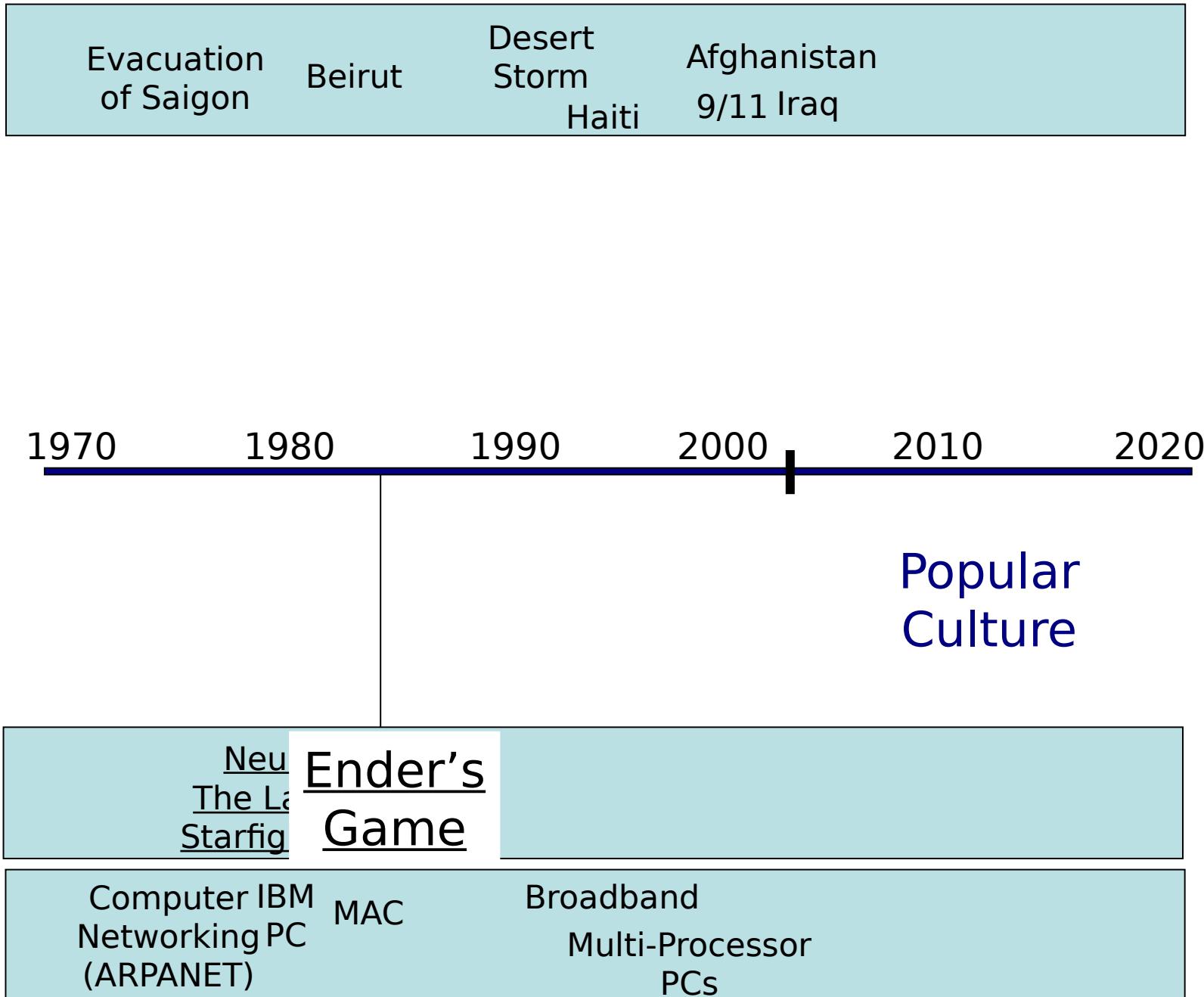
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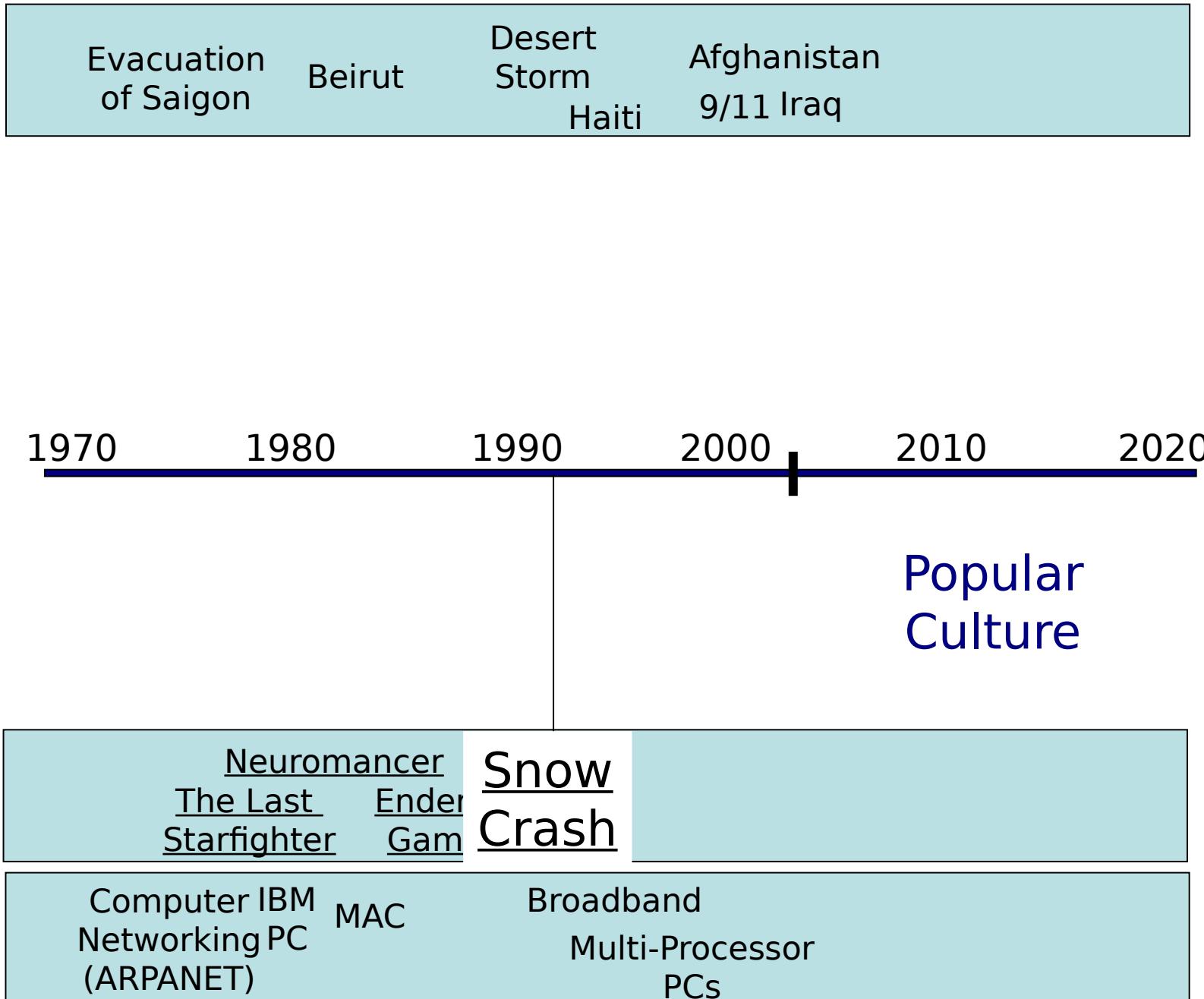
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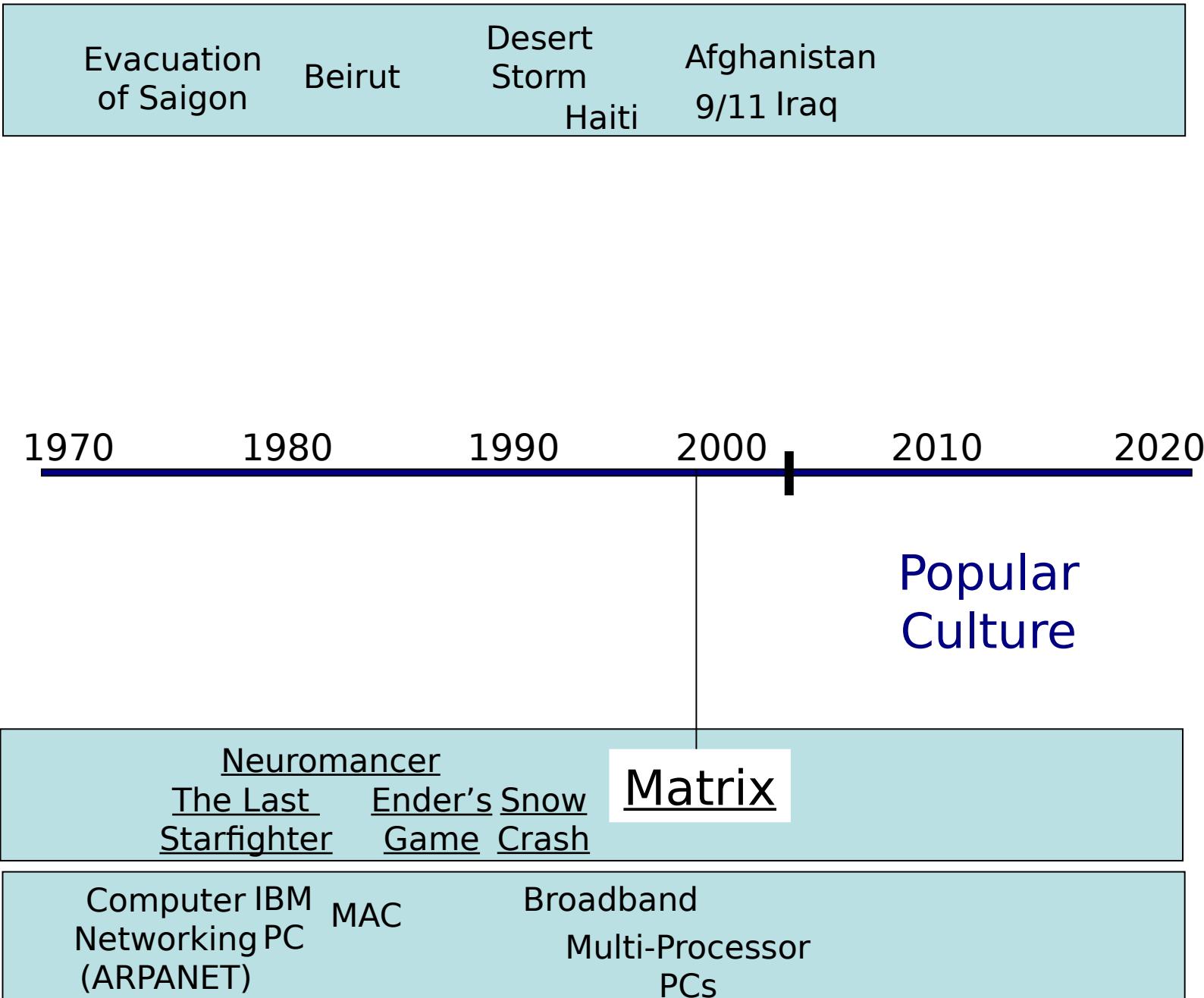
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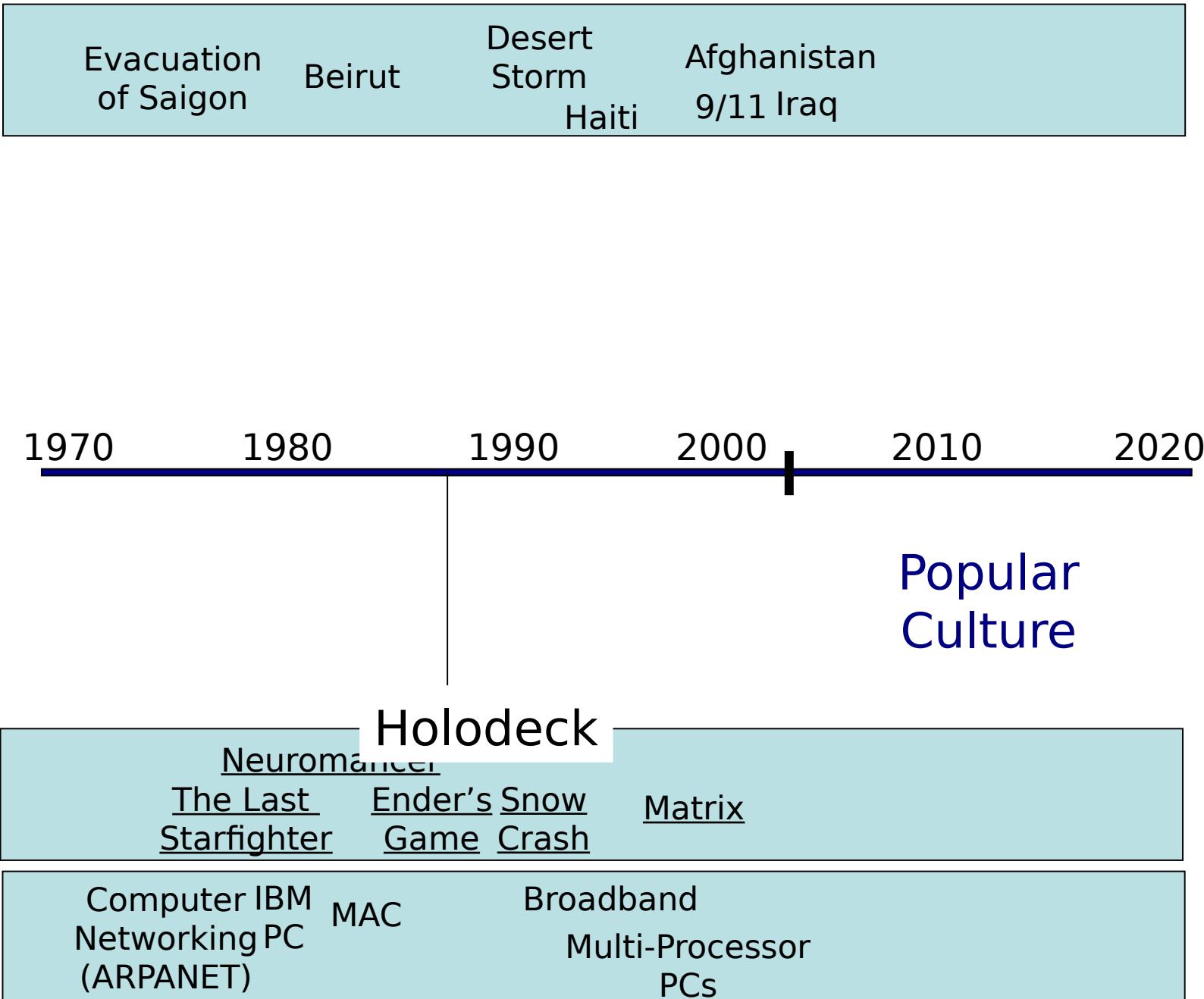
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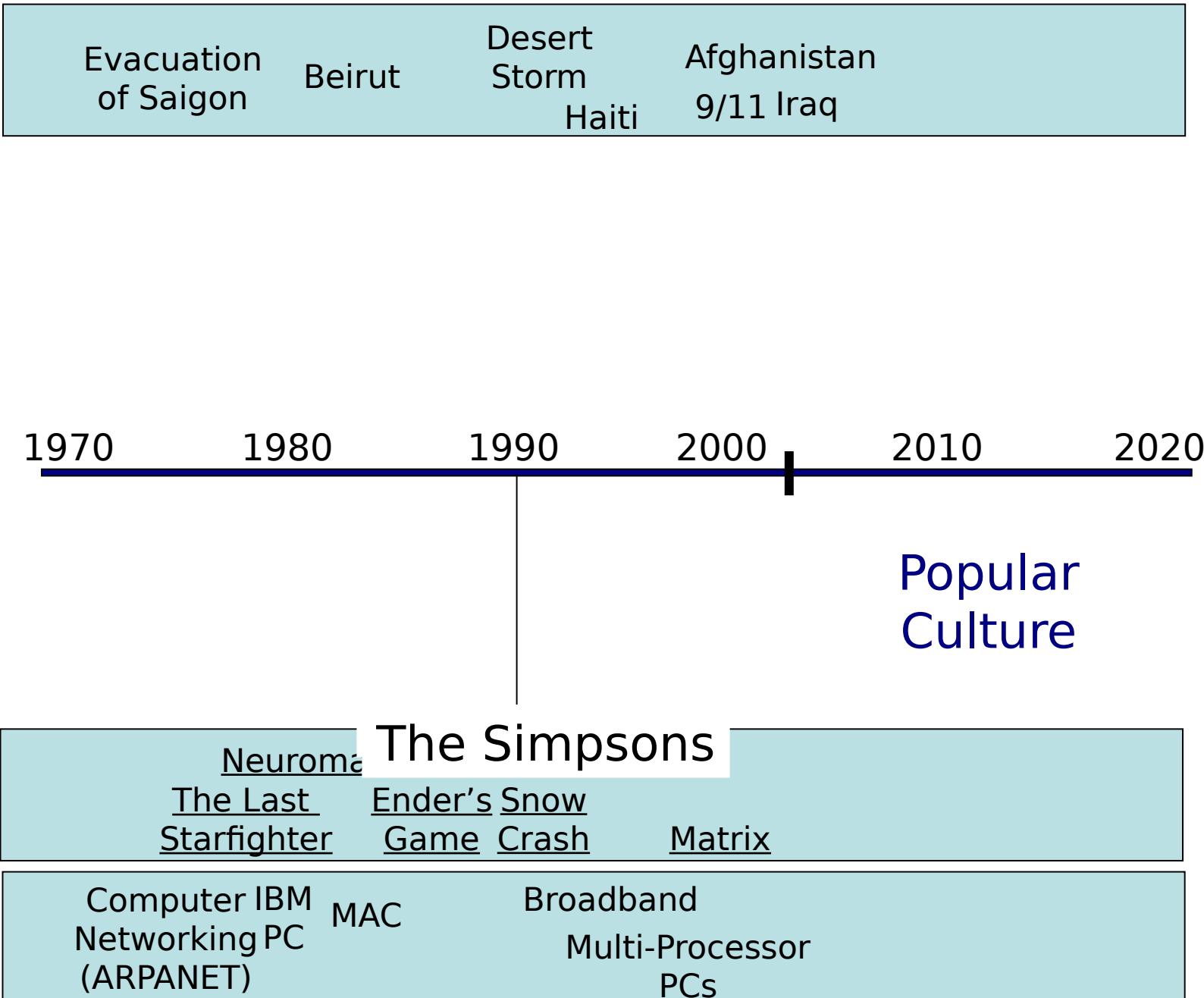
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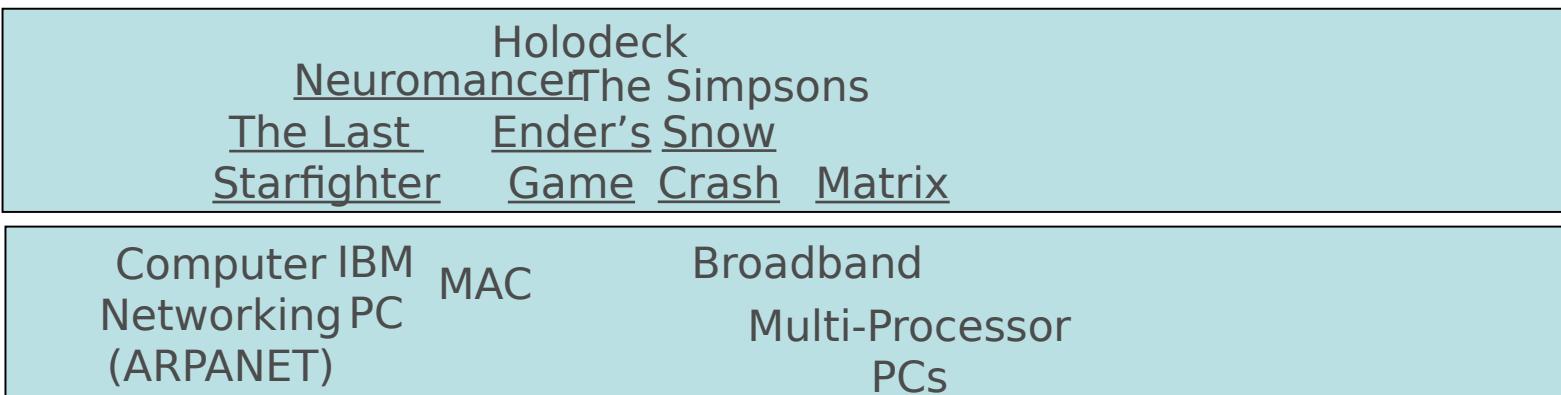
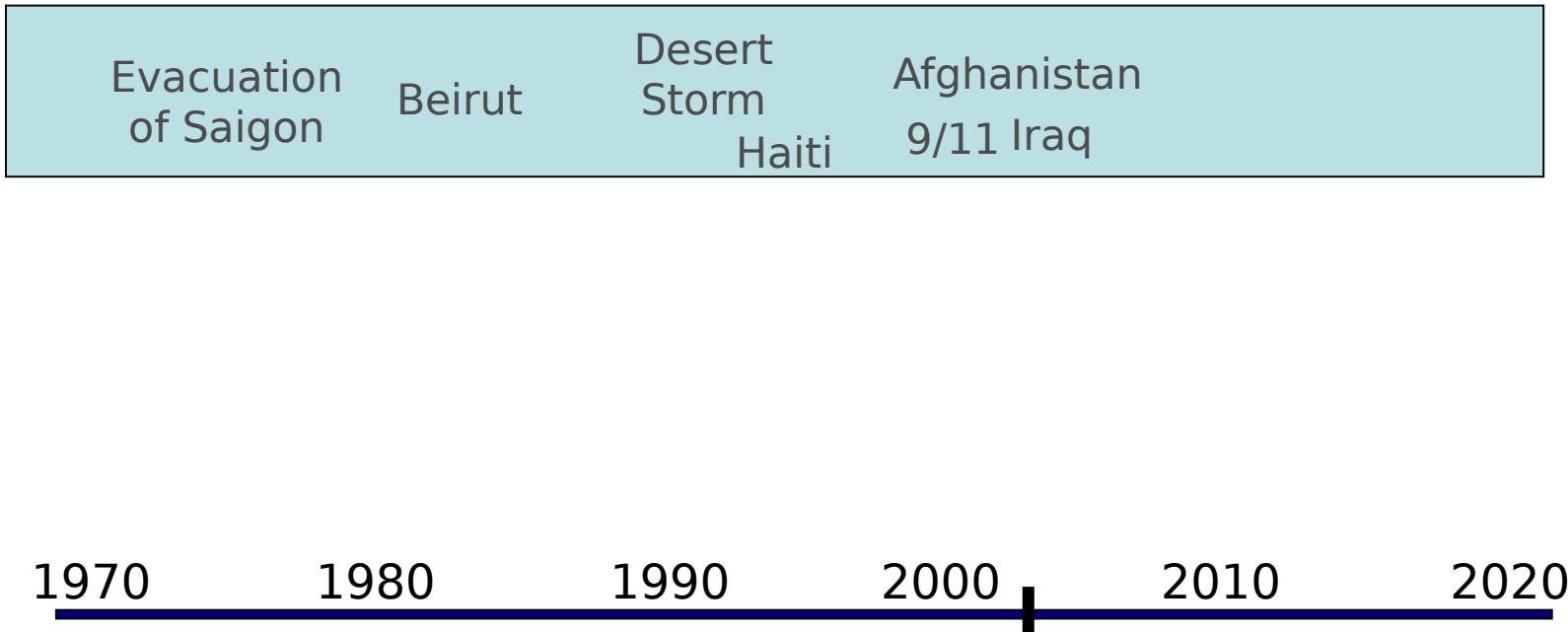
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N N N  
C C C  
E E E



Evacuation  
of Saigon

Beirut

Desert  
Storm  
Haiti

Afghanistan  
9/11 Iraq

*“Holographic  
Sand Table”  
& LANs for  
Simulators*



Holodeck  
Neuromancer The Simpsons  
The Last Ender's Snow  
Starfighter Game Crash Matrix

Computer IBM  
Networking PC  
(ARPANET)

Broadband  
Multi-Processor  
PCs

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E

Evacuation  
of Saigon      Beirut      Desert  
Storm      Haiti      Afghanistan  
9/11 Iraq

*“Holographic  
Sand Table”  
& LANs for  
Simulators*



Simulator  
Networking  
(SIMNET)

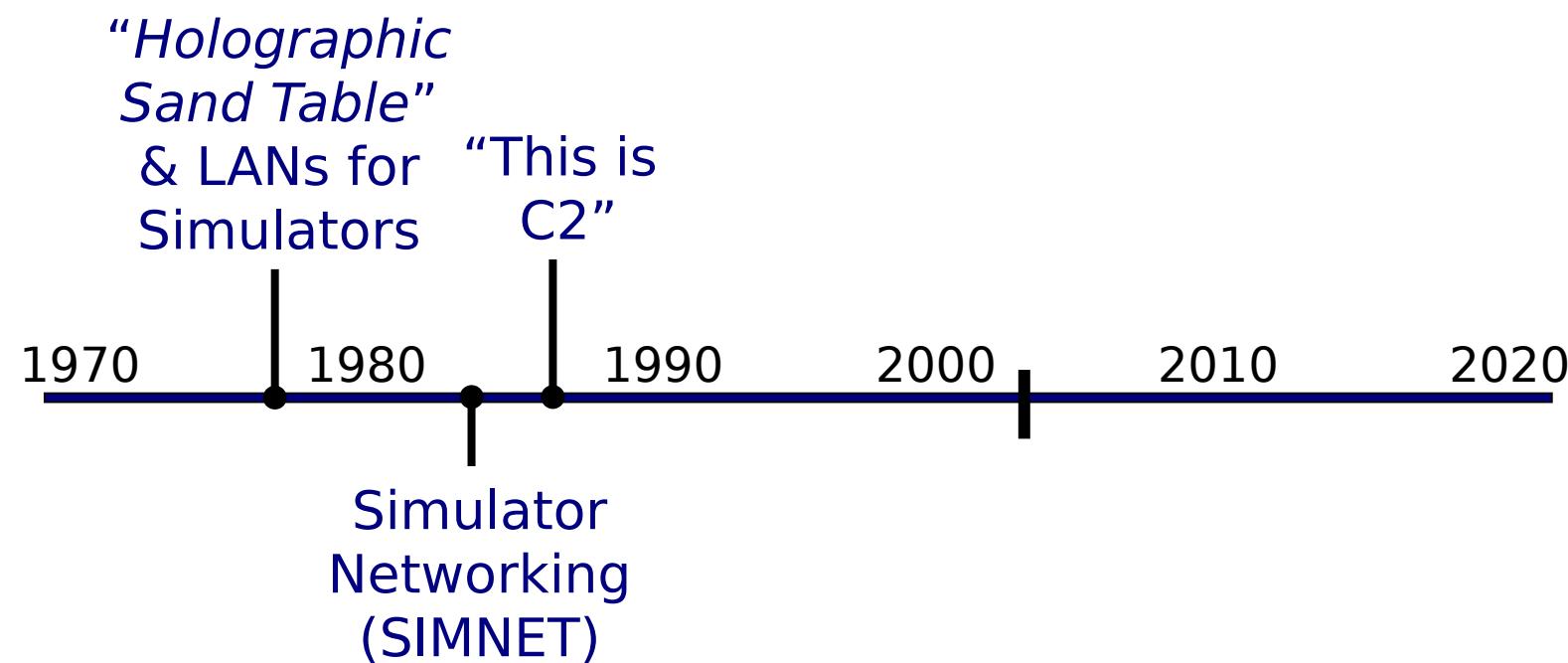
Holodeck  
Neuromancer The Simpsons  
The Last Ender's Snow  
Starfighter Game Crash Matrix

Computer Networking  
IBM PC (ARPANET)  
MAC

Broadband  
Multi-Processor  
PCs

C C C  
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V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E

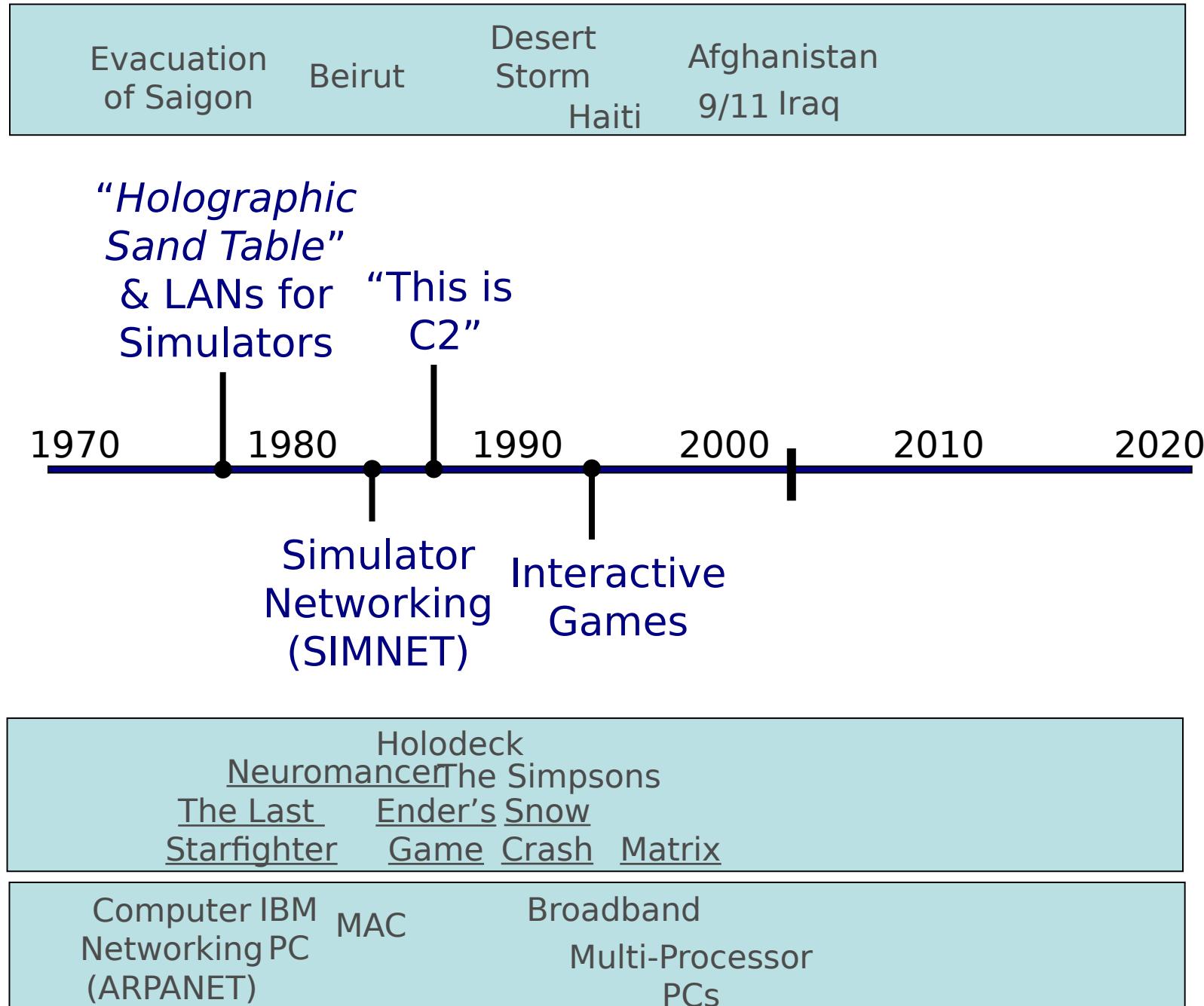
Evacuation  
of Saigon      Beirut      Desert  
Storm      Haiti      Afghanistan  
9/11 Iraq



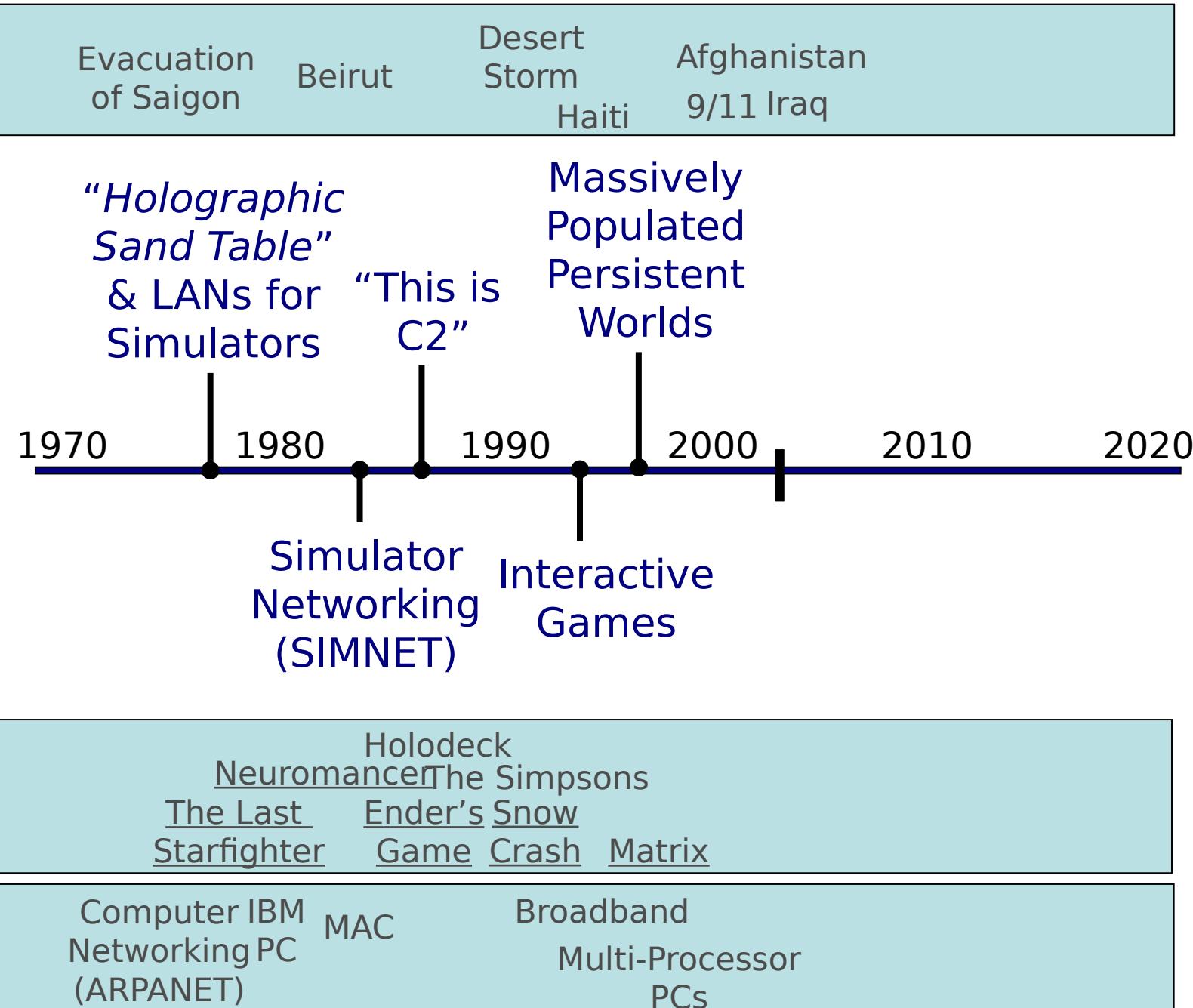
Holodeck  
Neuromancer      The Simpsons  
The Last      Ender's Snow  
Starfighter      Game Crash      Matrix

Computer IBM      MAC  
Networking PC      Multi-Processor  
(ARPANET)      PCs

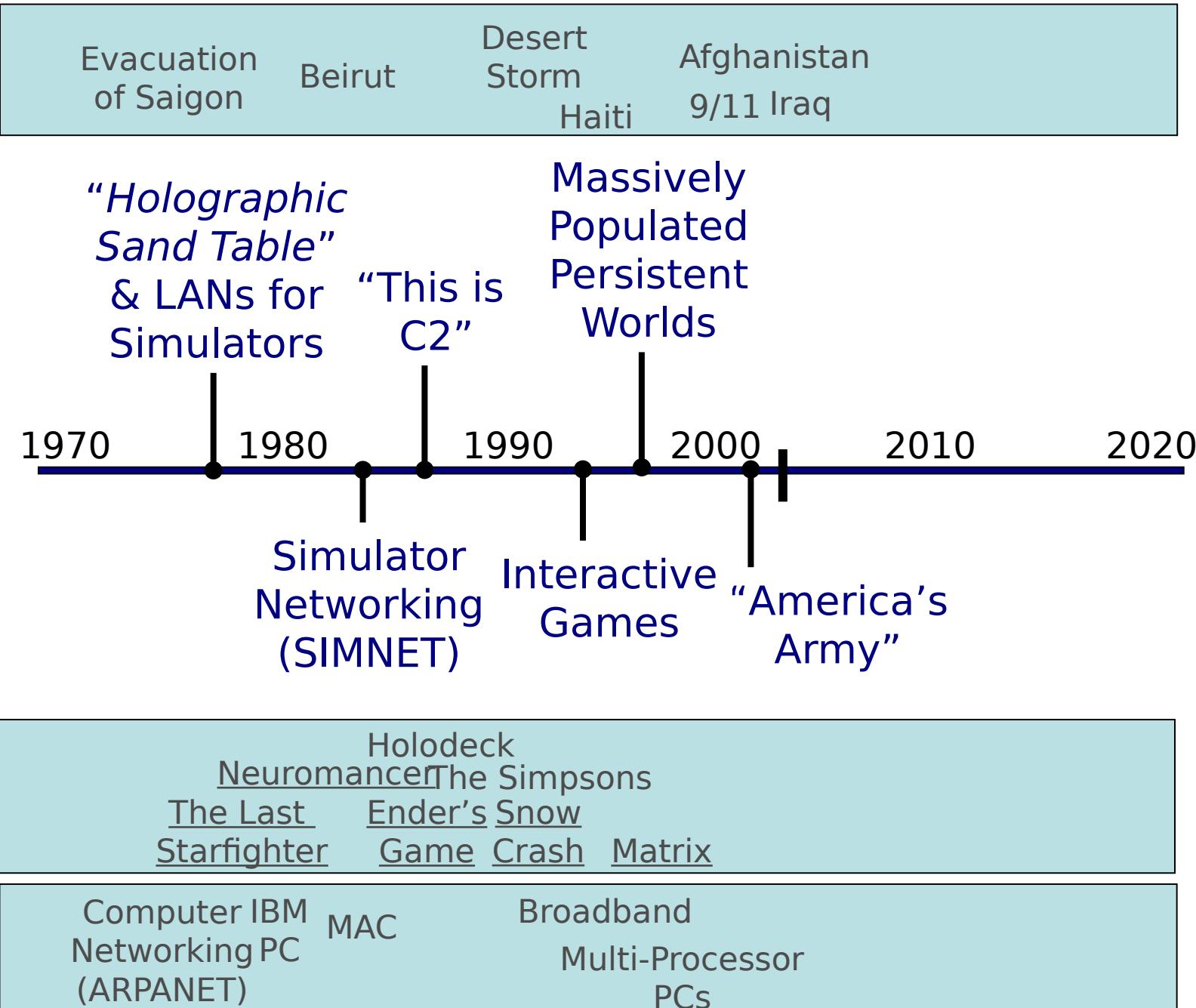
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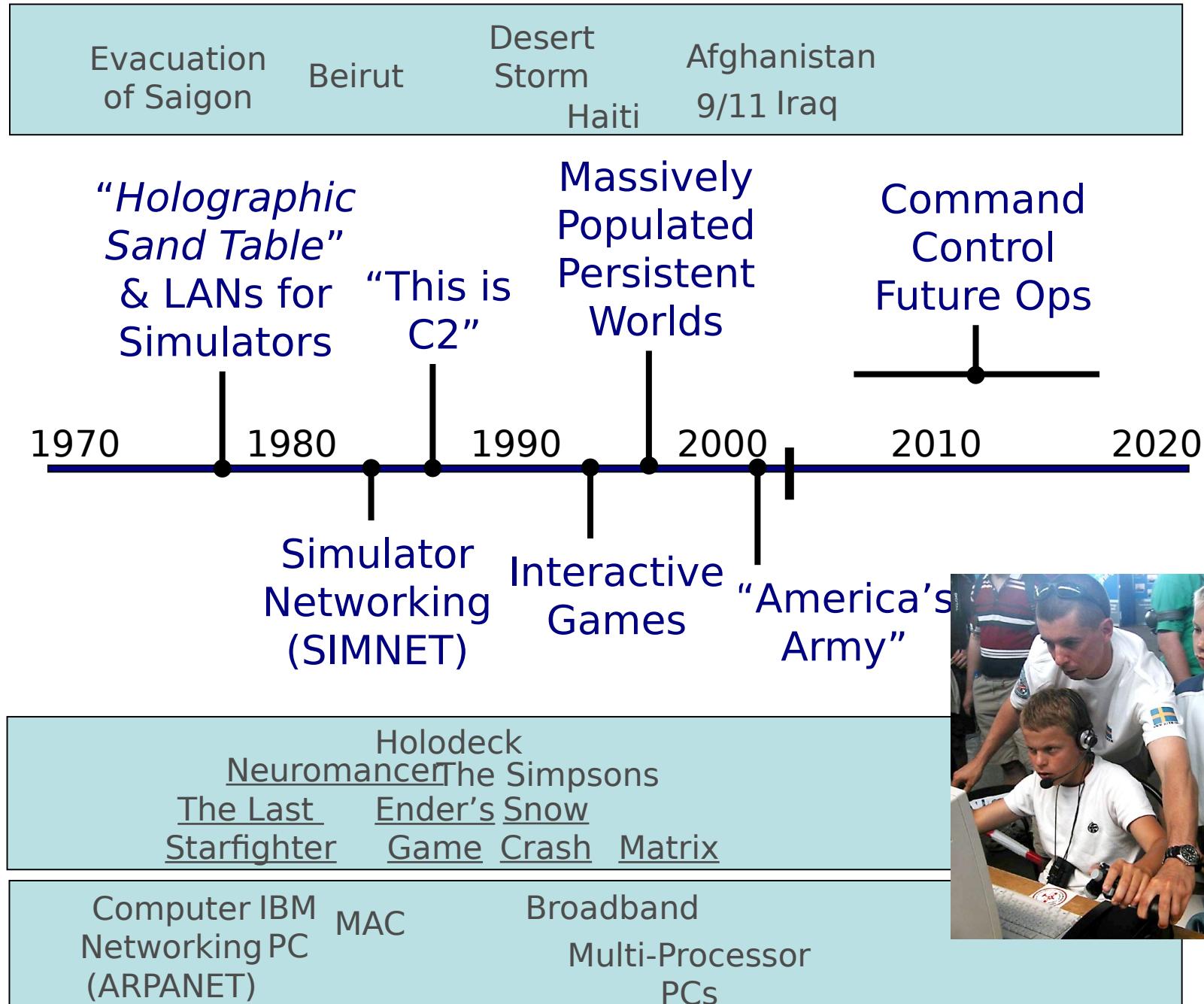
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C C C  
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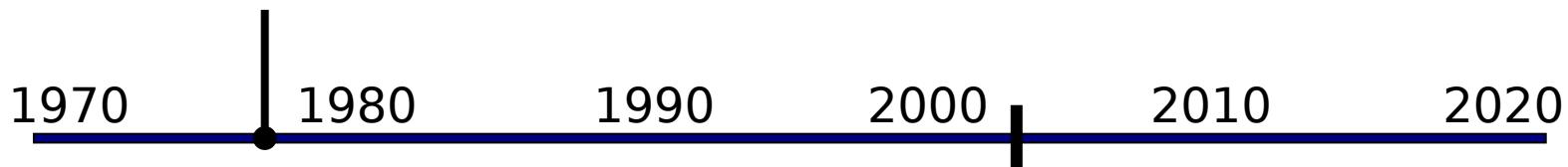
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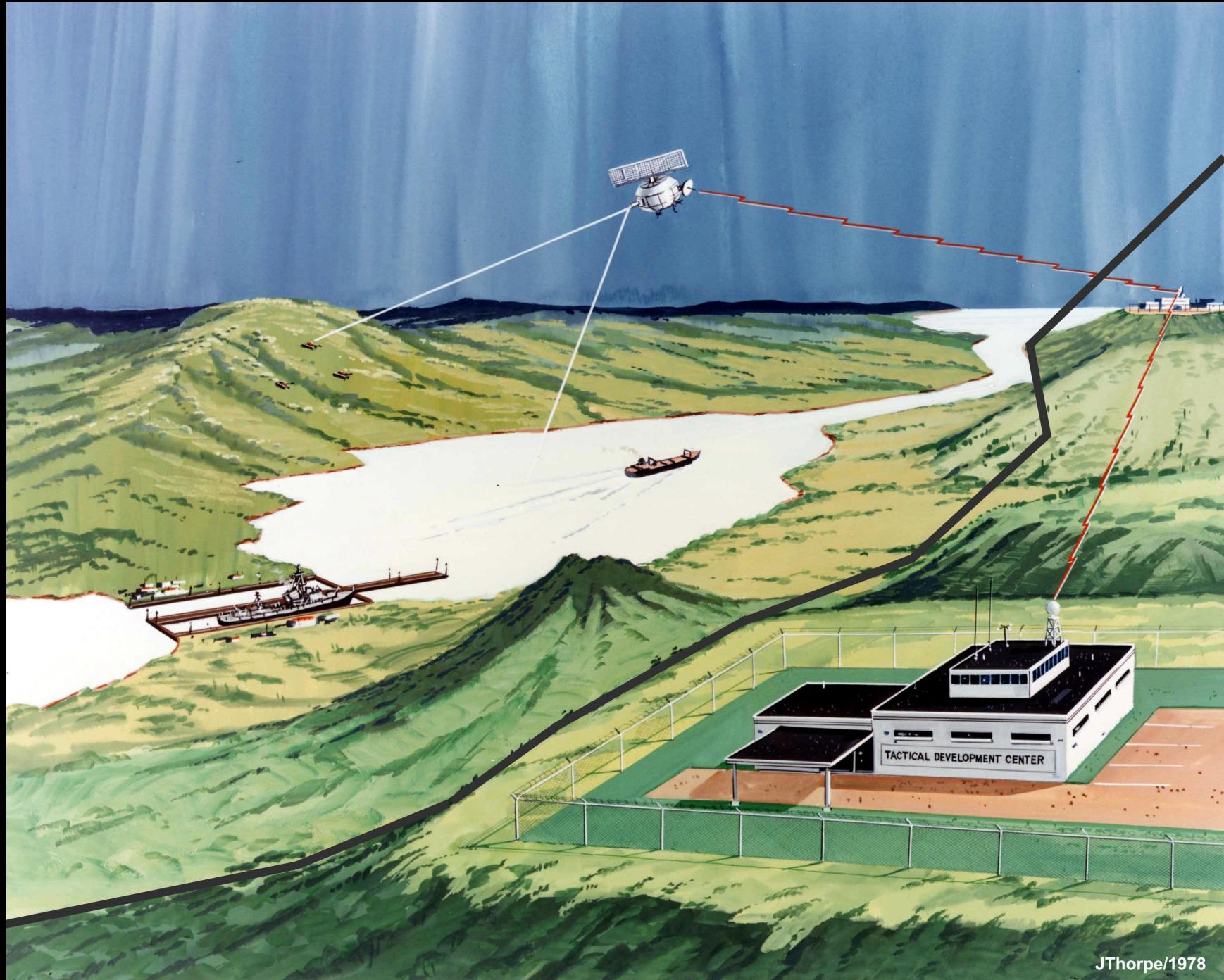


CCC  
OOO  
NNN  
VVV  
EEE  
RRR  
GGG  
EEE  
NNN  
CCC  
EEE

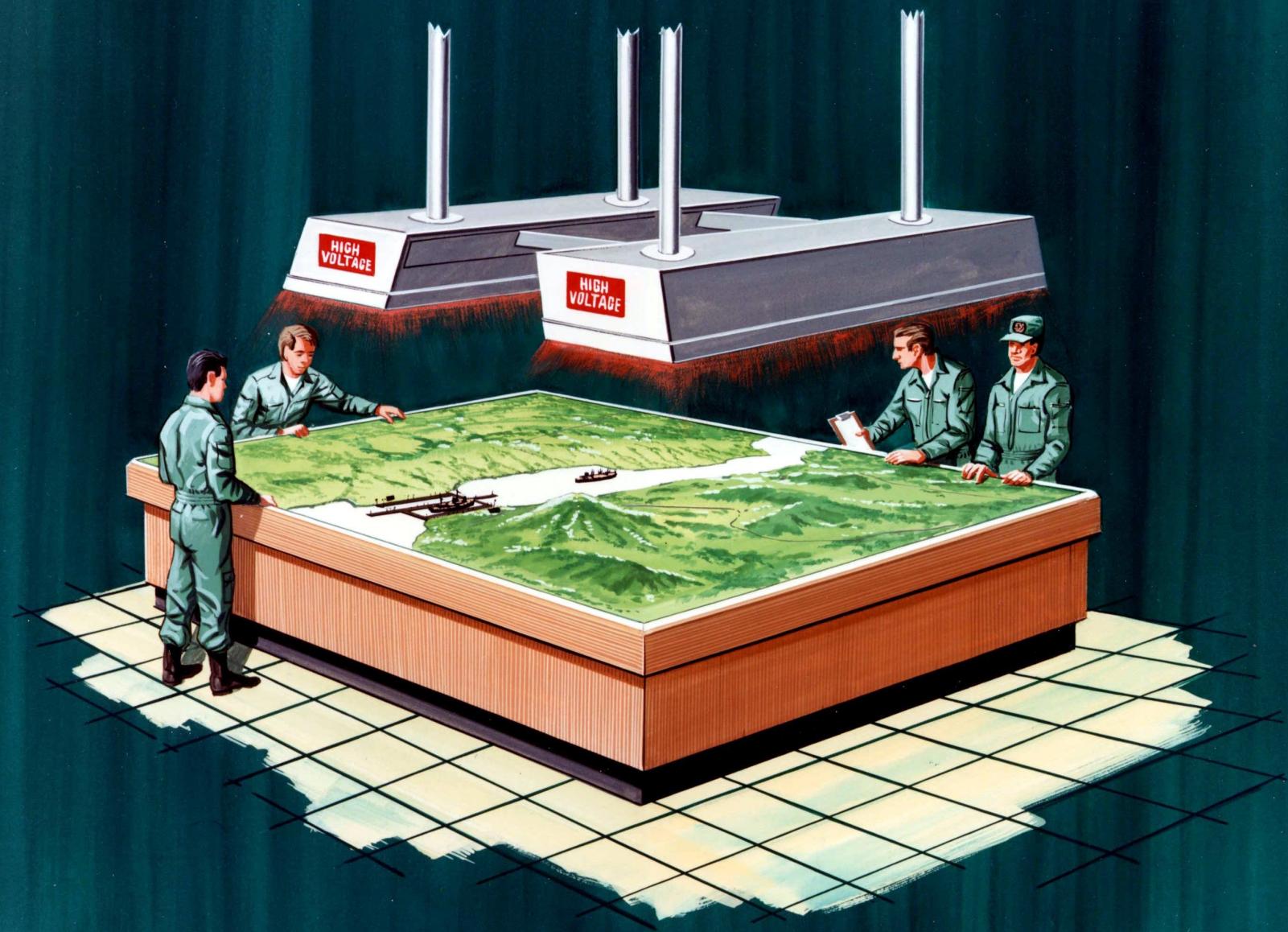


“*Holographic  
Sand Table*”  
& LANs for  
Simulators

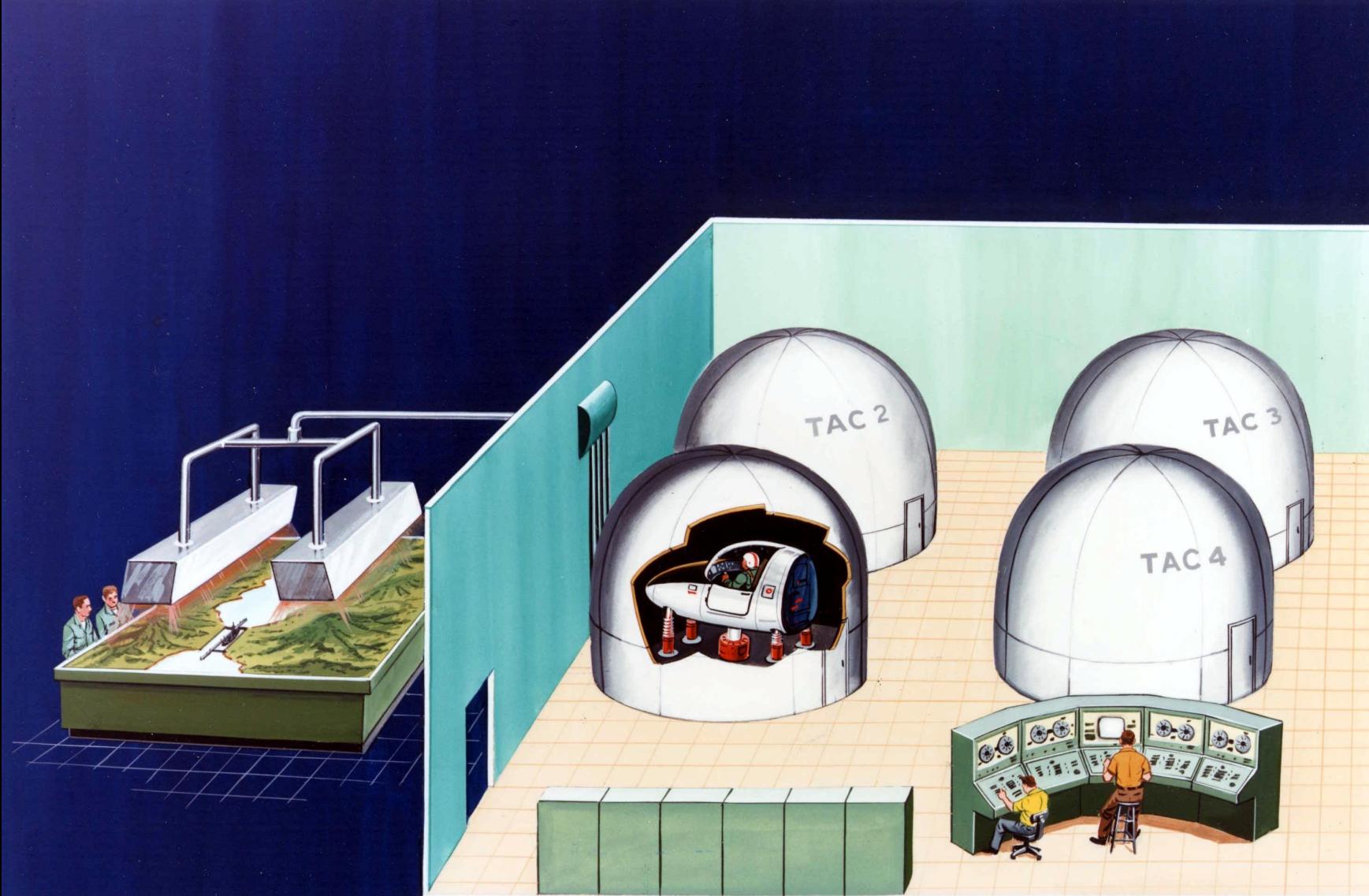


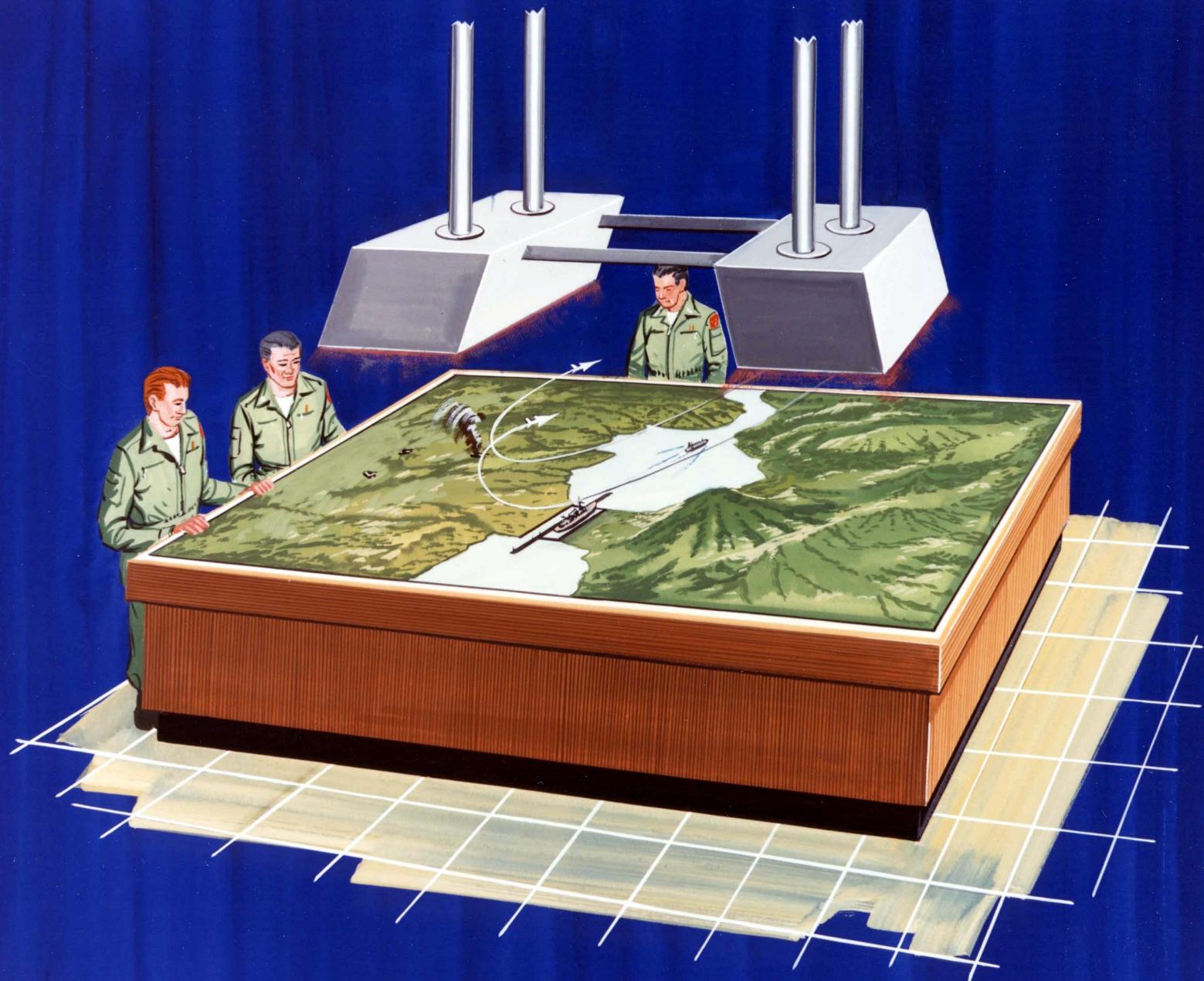


JThorpe/1978



JThorpe/1978





JThorpe/1978

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E

1978

Response: “Good idea. How do you do it?”

Answer: “Dunno”

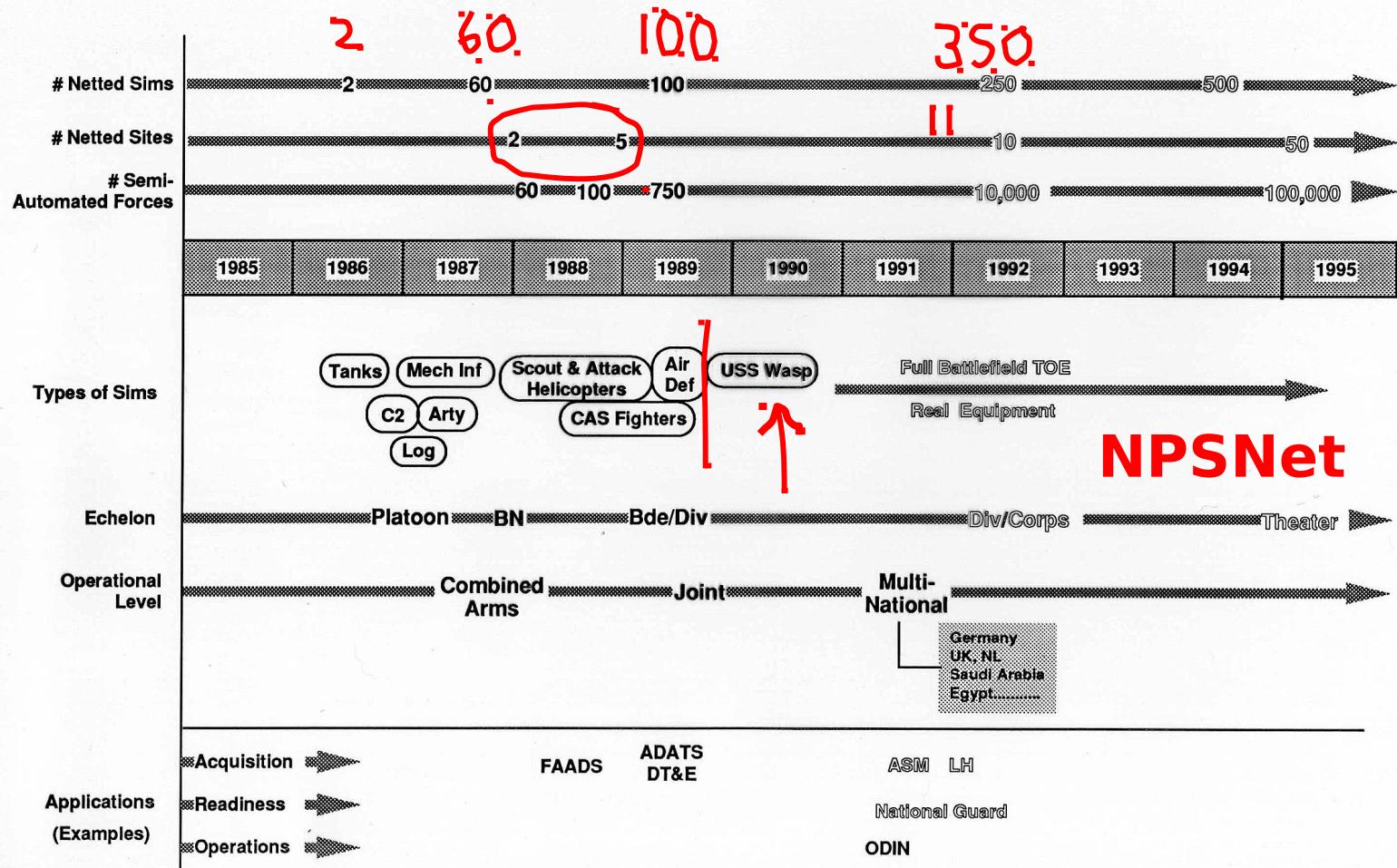
5 years later....\*



Simulator  
Networking  
(SIMNET)

\* 20 years, 14 days from today

## Progress in Advanced Simulation Development



# Canadian Army Trophy - '87



Crews not allowed to practice on competition range

US platoons train in DARPA-developed networked simulators on an identical reproduction (virtual) of the competition range

# Canadian Army Trophy - '87

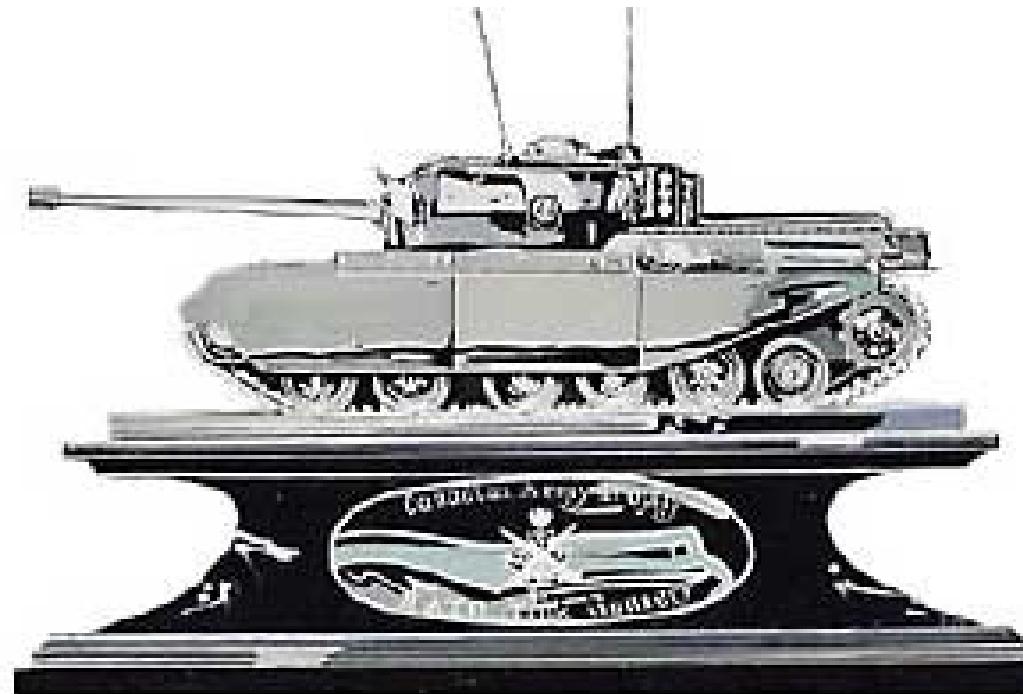
C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E



Platoon moving down range facing 60 of a possible 150 targets

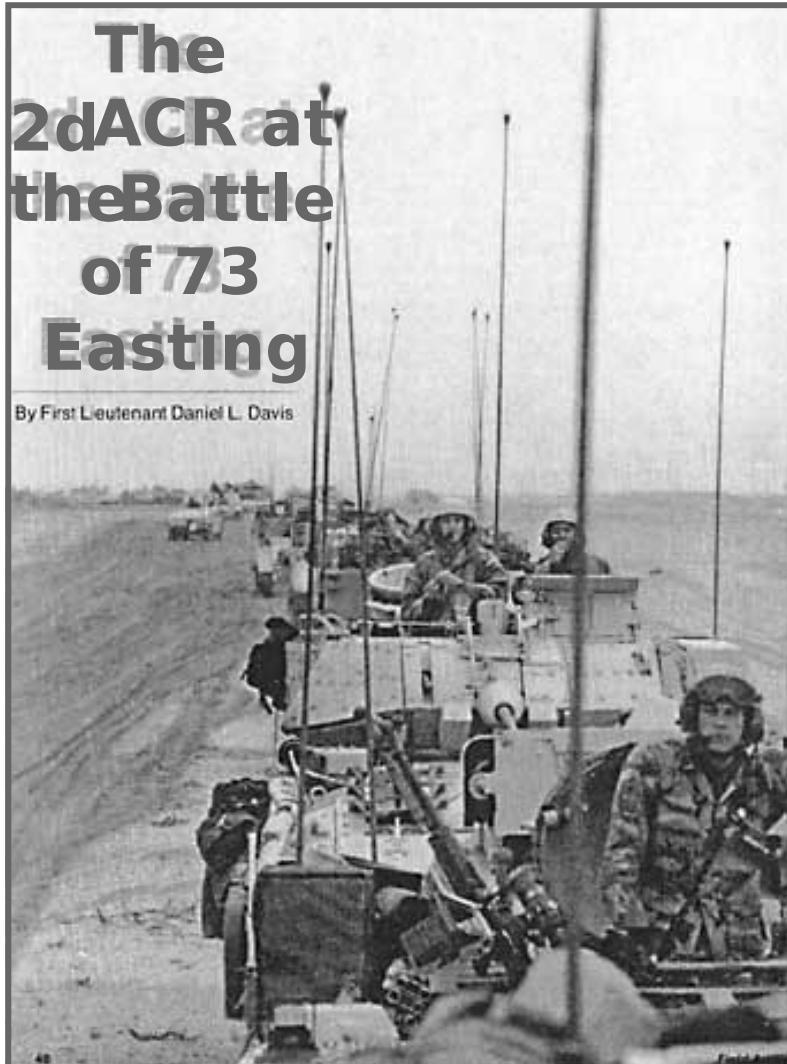
# Canadian Army Trophy - '87

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E



US wins the CAT competition for the first time

# DARPA's Reconstruction of the Battle of 73 Easting



## The 2dACR at the Battle of 73 Easting

By First Lieutenant Daniel L. Davis



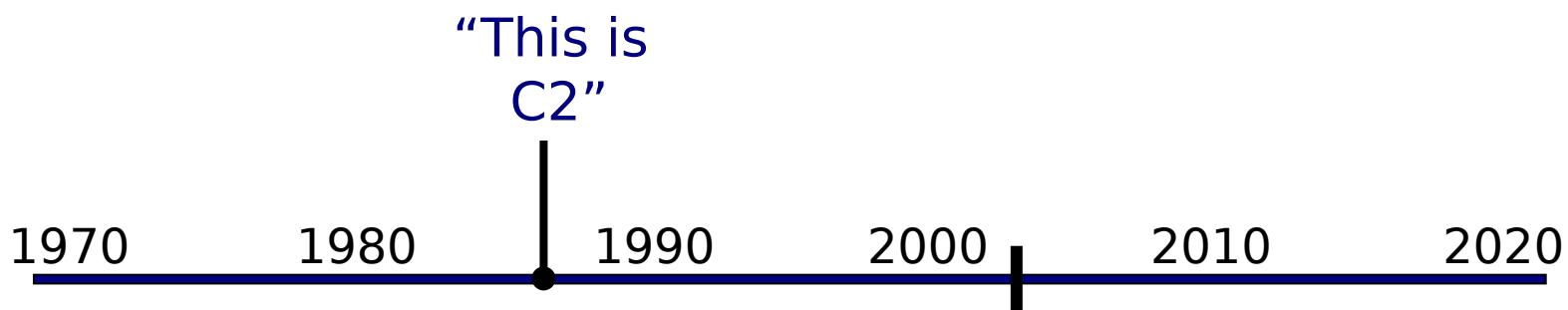
“Most accurately documented battle in history” [Jesse Orlansky, IDA]

240 citations for “73 Easting” in Google

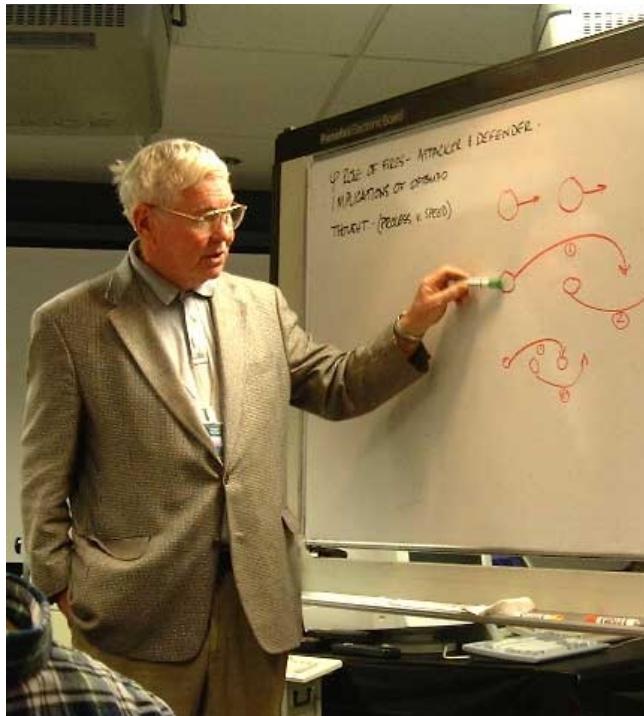
- Scholarly references
- Historical descriptions
- Games - ‘73 Easting Scenario’
- Comic books & movie scripts

Commander (1st Lt): “We’ve fought tougher battles....at the NTC, in simulators, on ranges...”

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E



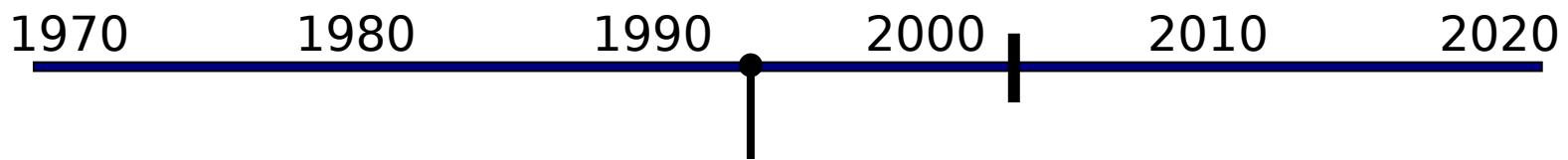
# “This is a Command and Control system!” - ~1987



General Paul Gorman,  
US Army, ret

- Network of thousands of computers and other comm devices
- Widely distributed
- Connects hundreds of elements
- Passes large quantity of multi-media data
- Enables communication

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E



Interactive  
Games

In parallel developments.....

# Enabling Technologies

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E



Networking

Improved  
Processing  
(better AI)

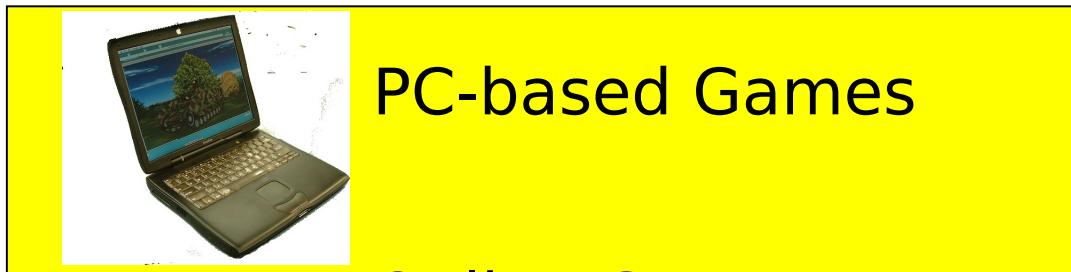
Separate  
Dedicated  
Graphics  
Processor

=  
More  
Processing  
=  
More AI

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E



Game Consoles (game stations)



Online Games

**Internet**

Multi-Player Collaborative Games

**Internet**



Team Fortress II



Team Fortress II



Team Fortress II



Team Fortress II



Team Fortress II



Team Fortress II



Game Consoles (game stations)



PC-based Games

Online Games

**Internet**

Multi-Player Collaborative Games

**Internet**

PC & Mac

C  
C  
O  
O  
N  
N  
V  
V  
E  
E  
R  
R  
G  
G  
E  
E  
N  
N  
C  
C  
E  
E

# Good News: WarBirds - Multiplayer Online

WarBirds

PC 2.75 MAC 2.20  
Latest Versions

FREE online investing newsletters  
what we know can make you money.  
Stocks & Markets Daily  worldlyinvestor.com

Entertainment Network

Welcome to the WarBirds Recruitment Site!

WarBirds HeadQuarters

Rolling Plane Set

Contact

WebOps

Do you like WarBirds?  
Tell a friend!

Read Dogfighter I do.

Airpower!  
Quality Diecast  
Miniature WWII  
Aircraft

FREE online investing newsletters  
what we know can make you money.  
Stocks & Markets Daily  worldlyinvestor.com

Entertainment Network

Welcome to the WarBirds Recruitment Site!

BOG FIGHTER.COM  
ONLINE FLIGHT SIM  
1999 AWARDS

# WarBirds

- WarBirds is an award winning megaplayer simulation of World War II aerial combat.
- Hundreds of players fly simultaneously in a variety of online arenas, dogfighting and bombing enemy targets.
- Four sides to fly for, with over fifty planes and variants with realistic flight models in the Main arena.
- Unlimited online play in the Air Combat Arena with a choice of five frequently changed planes in an easy flying environment for only \$9.95 per month!
- Take to the skies and fight for the glory of yourself and your comrades

There are just five steps for newcomers to WarBirds to follow. For a faster, but less informative beginning, just follow steps #2 and #3.

5 Steps For NEW Recruits

- 1 PreFlight Check
- 2 Create An Account
- 3 Download
- 4 Recruit Tutorial
- 5 Training & Squadrons

Flying  
FORTRESS

brake  
— 15

AUTO  
BRAKE  
BEACON



21 24

0 1 2  
CH MB

SLIP  
INDICATOR

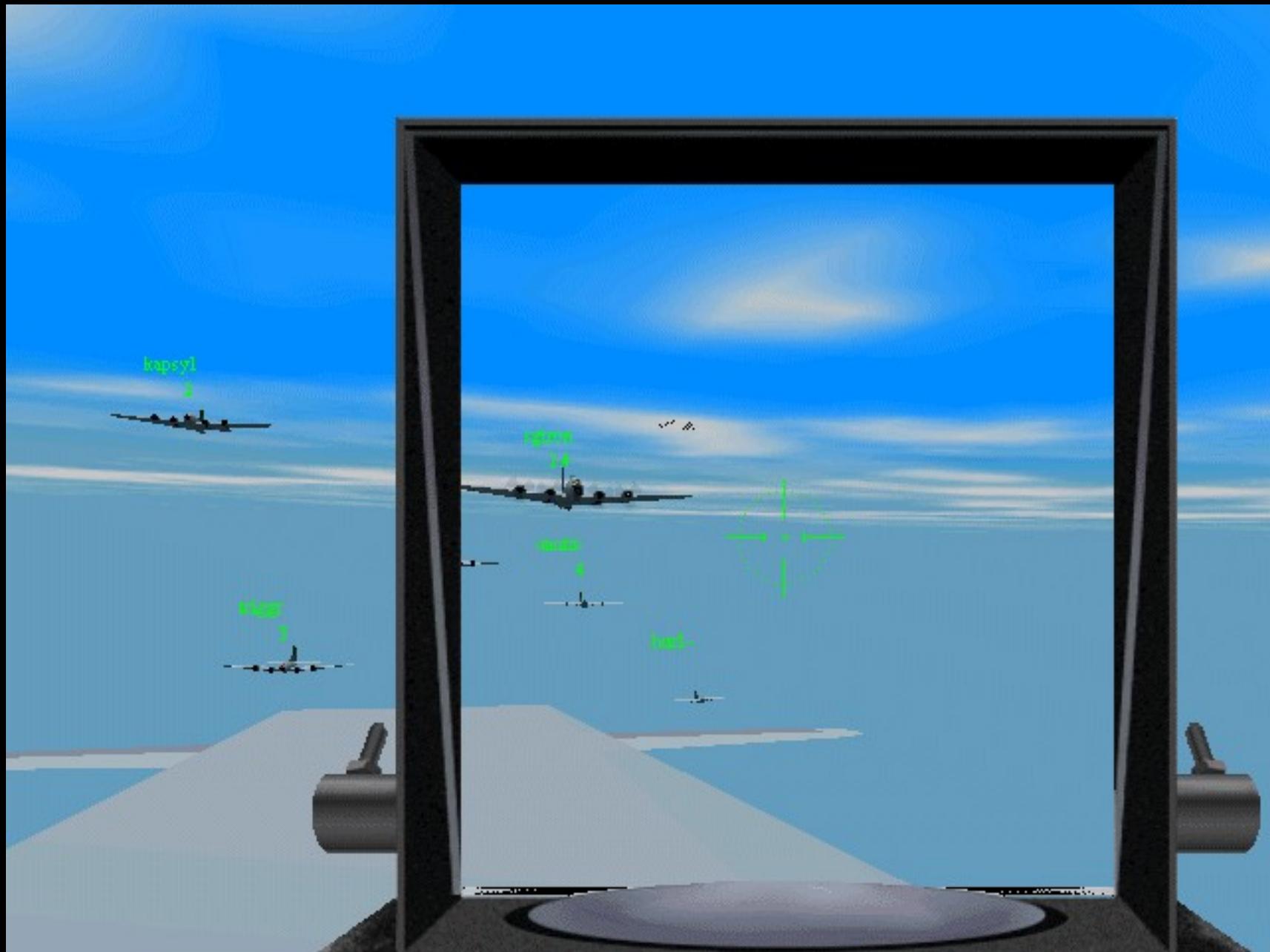
OFF 100 IDLE 100 IDLE  
75 ENG 50 75 ENG 50

UP  
FLAPS  
DOWN

OFF 100 IDLE 100 IDLE  
75 ENG 50 75 ENG 50

OFF 100 IDLE 100 IDLE  
75 ENG 50 75 ENG 50

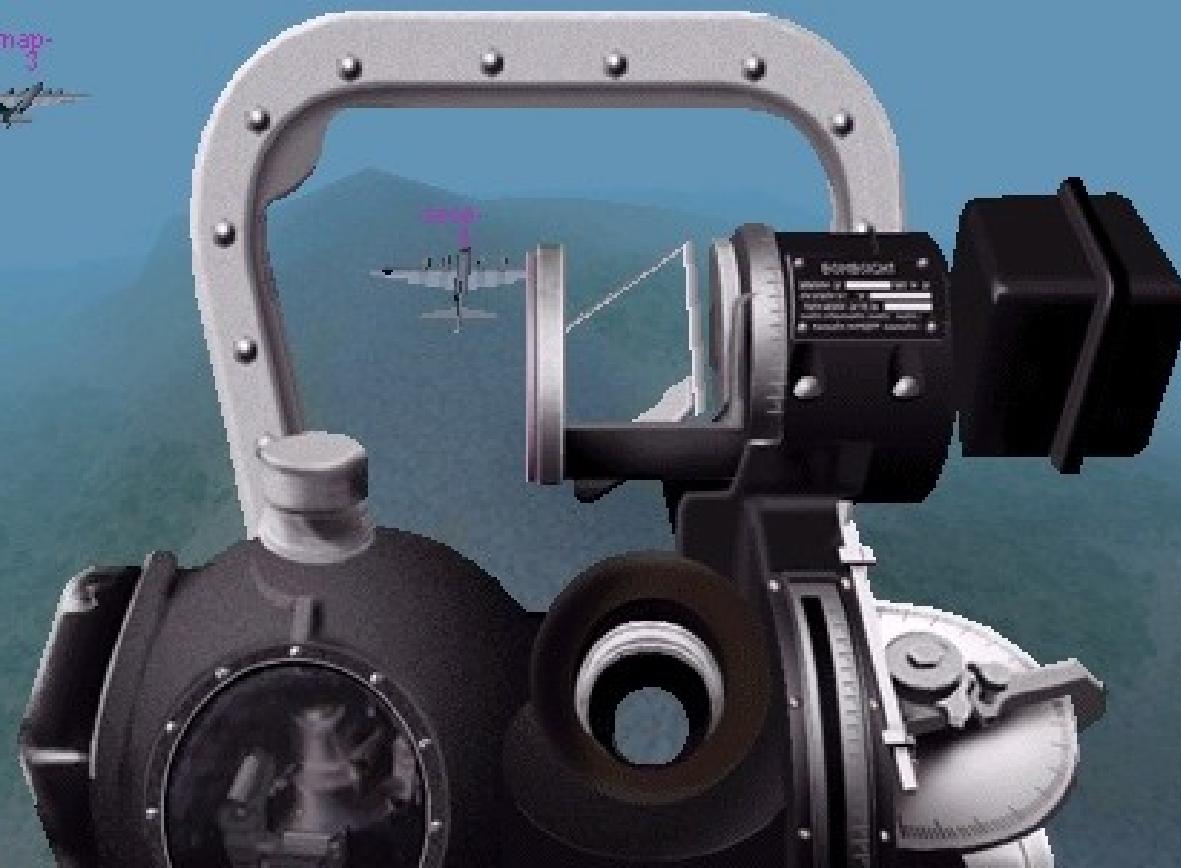
B10 1  
ORDNANCE  
BOMB BAY DOORS



phenix  
5



-snap-



C

E



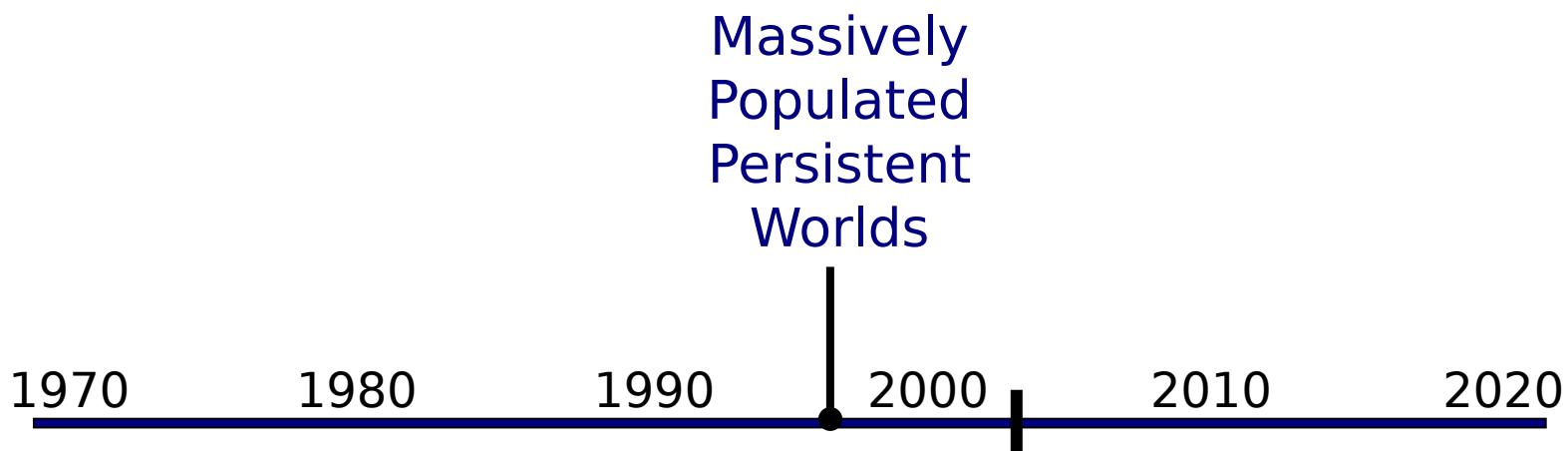
C  
O  
N  
V  
E  
R  
G  
E  
N  
C  
E



Scale: few hundred players

Structure: Air Missions (few hours)

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E



# Other Terms

Secondary World (Tolkien, 1939)

Virtual Words

Persistent worlds

Persistent online worlds

Persistent state worlds

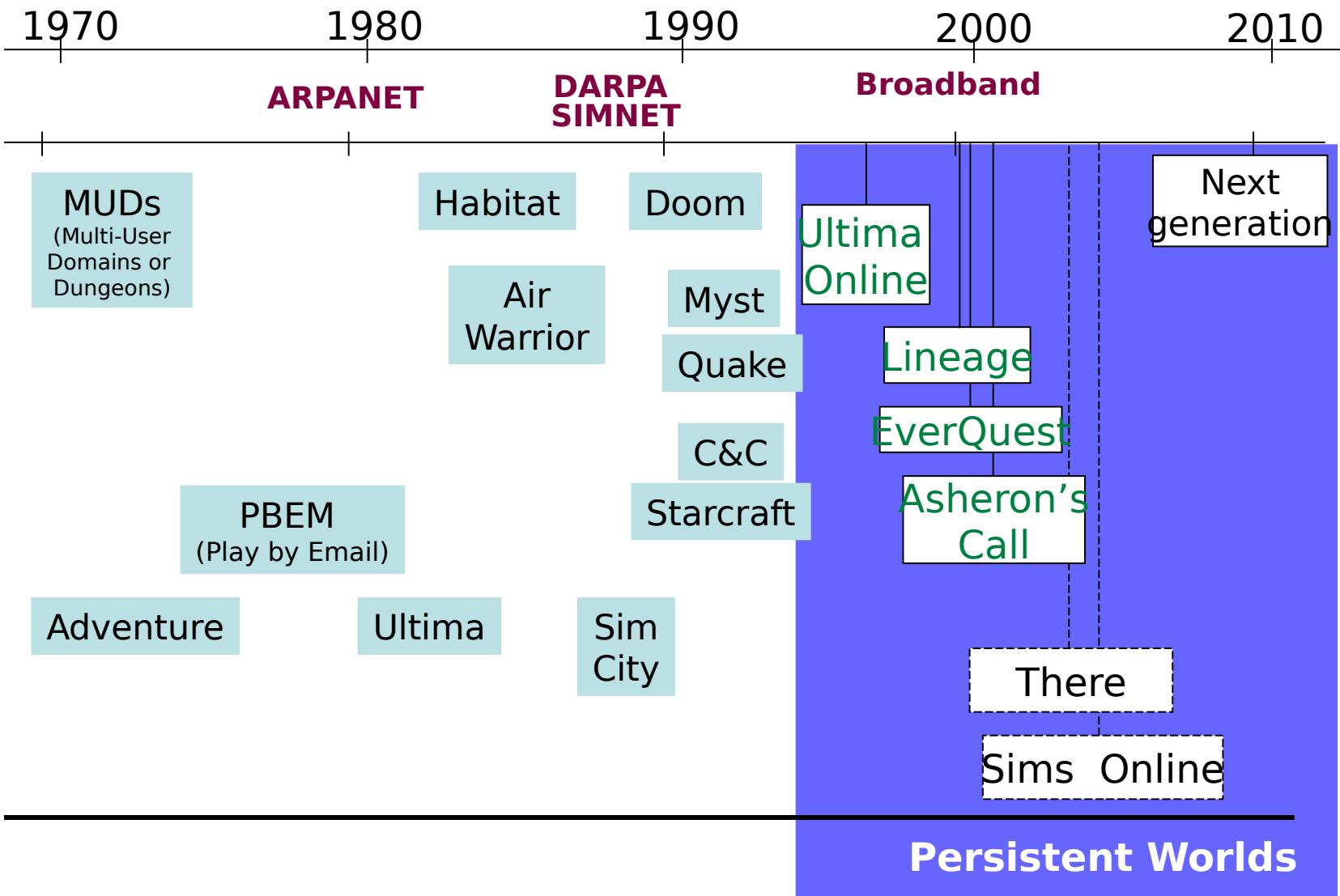
Massively Multi-Player persistent universe

Massively Multi-player Persistent Worlds

Massively Multi-Player Online Role Playing  
Games (MMORPG)

# Persistent Worlds - A Relatively Recent Development

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E



# Massively Populated Persistent Worlds

Massively  
Populated

3,000 - 10,000 simultaneous players (per server)  
out of a subscription base of several 100K

---

Online

Internet based, world-wide access

---

Persistent

Exists 24x7 whether anyone is there or not; ecology continues to function; persistent social environment

---

Worlds

All the features of a natural world environment  
(Physical, Economic, Social, Political....)

# Current State of the Art

- 24x7 access to Persistent Worlds by 100,000s of players world-wide
  - Economies form
  - Social relationships are created
  - Political events occur
  - Millions of transactions daily
- People do what people do
  - Large demographic
  - Unconstrained by typical “assumptions”
  - Unconstrained by typical “production rules”
  - **Naturally emerging asymmetric behaviors**
    - Internal
    - External (self-organization; C2 using latest IT; OP orders....)

# What is new?

## Massively Populated

People from everywhere!!  
Most languages, Most cultures

## Network

World-wide access supporting  
1000's of players, 24x7, real-  
time, robust

## Transactions

- ✓ Communications
- ✓ Financial
- Education
- ✓ Travel
- ✓ Medical
- Veterinary
- ✓ Country Entry
- ✓ Place / Event Entry
- ✓ Transportation
- ✓ Housing
- ✓ Critical Resources
- Government...

All the characteristics of a  
C2 system



“America’s  
Army”



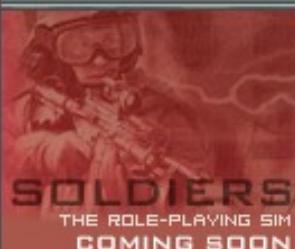
PERSONAL COURAGE

ABOUT DOWNLOADS EVENTS COMMUNITY NEWS REGISTER SUPPORT THE U.S. ARMY

games

OPERATIONS

SOLDIERS



DEV TEAM INTEL  
LATEST GAME UPDATES  
FROM THE DEV TEAM.  
[CLICK HERE](#)

## OPERATIONS

Become a member of the world's premier land force; trained and equipped to achieve decisive victory - anywhere. [more >>](#)

## SOLDIERS

Build and train your soldier as you experience the full range of basic training and military life. [more >>](#)

### NEWS / PRESS

#### New AOT Support System

February 12, 2003

Due to a high demand from users who want to play America's Army: Operations combined with the higher system requirements of the advanced engine, traffic has been high in the Army's AOT Technical Support system.

#### New Advanced Operation's Servers

February 07, 2003

The Army recognizes that virtual Soldiering, like real Soldiering, is a result of training and skill.

#### Active Duty Soldiers - Show Your Pride!

February 05, 2003

For all of you in active military duty, you can now add veteran tags to your in-game name and have them show up on the score screen.

#### HOOAH to Homelan!

February 05, 2003

HomeLAN has just released a new web-based tool for account management. You can now log in to your account and change your password, update your information, and more.



### EVENTS

S M T W R F S

	01
	02 03 <u>04</u> 05 06 07 08
	09 10 11 12 13 14 15
	16 17 18 19 20 21 22
	23 24 25 <u>26</u> 27 28 29
	30 31

MARCH

UPCOMING EVENTS	
12.13.03	LAN PARTY
05.13.03	CONVENTION
11.15.03	LAN PARTY

[see all events >>](#)

**AMERICA'S AA ARMY**

**ABOUT DOWNLOADS EVENTS COMMUNITY**

**OPERATIONS**

**SOLDIERS**

**SOLDIERS COMING SOON**

**FEATURE**

LANDING IN AFGHANISTAN, A SOLDIER'S ACCOUNT.

DEV TEAM INTEL

LATEST GAME UPDATES FROM THE DEV TEAM.

CLICK HERE

**SOLDIERS COMING SOON**

**Soldiers:** An immersive role-playing sim. Build and train your soldier as you experience the full range of basic training and military life. Live the code of the Army: loyalty, duty, respect, selfless service, honor, integrity, and personal courage. The path to success is within grasp. Take it.

**SCREENSHOTS**

**ALL GOALS**

Select the goal to read its definition. Double click the "\*" icon to expand the Goal Tree.

**Goal Description**

**Work Hard**

Prerequisite goals: **CHEAT 40**

Requirements:

- energy greater than 10.0
- respect greater than 10.0

Results:

- cafeteriaServices increases by 10.0

Allows:

- Party
- Stereo
- Cell
- Deal with Authority

**CLOSE**

**Skip Intro**

**HISTORY**

**THE AIR ASSAULT**

These are your awards.

Knowledge of basic training and military life



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America's Army has been rated "Teen (T)" by the Entertainment Software Ratings Board (ESRB) due to depictions of blood and scenes involving aggressive conflict. Titles rating "Teen (T)" have content that may be suitable for persons ages 13 and older.

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# AMERICA'S AA ARMY.

ABOUT DOWNLOADS EVENTS COMMUNITY NEWS

OPERATIONS SOLDIERS

SOLDIERS THE ROLE-PLAYING SIM COMING SOON

DEV TEAM INTEL LATEST GAME UPDATES FROM THE DEV TEAM. [CLICK HERE](#)

PHOTO GALLERY

AFGHANISTAN WEBLOG

Check out our hand-selected photos from Afghanistan.  
Photo credits: Scorpion, Pugsley, Striperdog

Page [1](#) | [2](#) | [3](#) | [4](#) | [5](#)

Personal news from areas of operations





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**AMERICA'S AA ARMY.**

# OPERATIONS

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## ▼ AFGHANISTAN WEBLOG

Check out our hand-selected photos from Afghanistan.  
Photo credits: Scorpion, Buzzsaw, Strider02

[my.com](#) | [Parental Information](#)

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**AMERICA'S ARMY**

ABOUT DOWNLOADS EVENTS COMMUNITY NEW

OPERATIONS

SOLDIERS

NEWS

The Army is always changing. So is the news—especially if it's happening with *America's Army*! This page will bring you up-to-date information on what's new with the game. It will also host Web logs from a real Soldier and member of the *America's Army* game team stationed in Afghanistan!

TOP STORY

New AOT Support System

## Active Duty Soldiers - Show Your Pride!

February 05, 2003 - by Triston

For all of you in active military duty, you can now add veteran tags to your in-game name and have them show up on the score screen.

[read more >>](#)

play America's Army: Requirements of the Army's AOT Technical

## Scorpion in Afghanistan

and member of the team, this Weblog chronicles his time in Afghanistan in early Operation Enduring

Freedom (OEF). Be sure to check out the galleries of photos and videos shot while Scorpion was in Afghanistan.

[view the weblog >>](#)

## Prima Games Q&A Session

Prima Games is responsible for publishing the Official *America's Army* Strategy Guide. David Laprad, a writer for the Adreneline Vault Web Site, took some time to talk to Michael Knight of Prima Games and learn more about the guide.

[read the interview >>](#)

## HOOAH to Homelan!

February 05, 2003 - by Triston

Homelan has just released a new web-based tool

# America's Army Development

Sponsor: Recruiting Command

Overall Manager: USMA (Col Casey Wardynski)

Developer: Naval Post Graduate School (Mike Zyd)

- Recruiting
- Selection
- Basic Training, Acclimation, Socialization
- Systems Training
  - Weapons
  - Tech School)

- First Unit Assignment
- Team & Unit Training
- Practice
- Rehearsal
- Execution
- After Action Review
- Historical Documentation

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E



Command  
Control  
Future Ops

So what.....?

# New Technology without New CONOPS is a dead-end

In an information-based society, games (models, simulations) are simultaneously pure abstractions as well as manifestations of events and phenomena

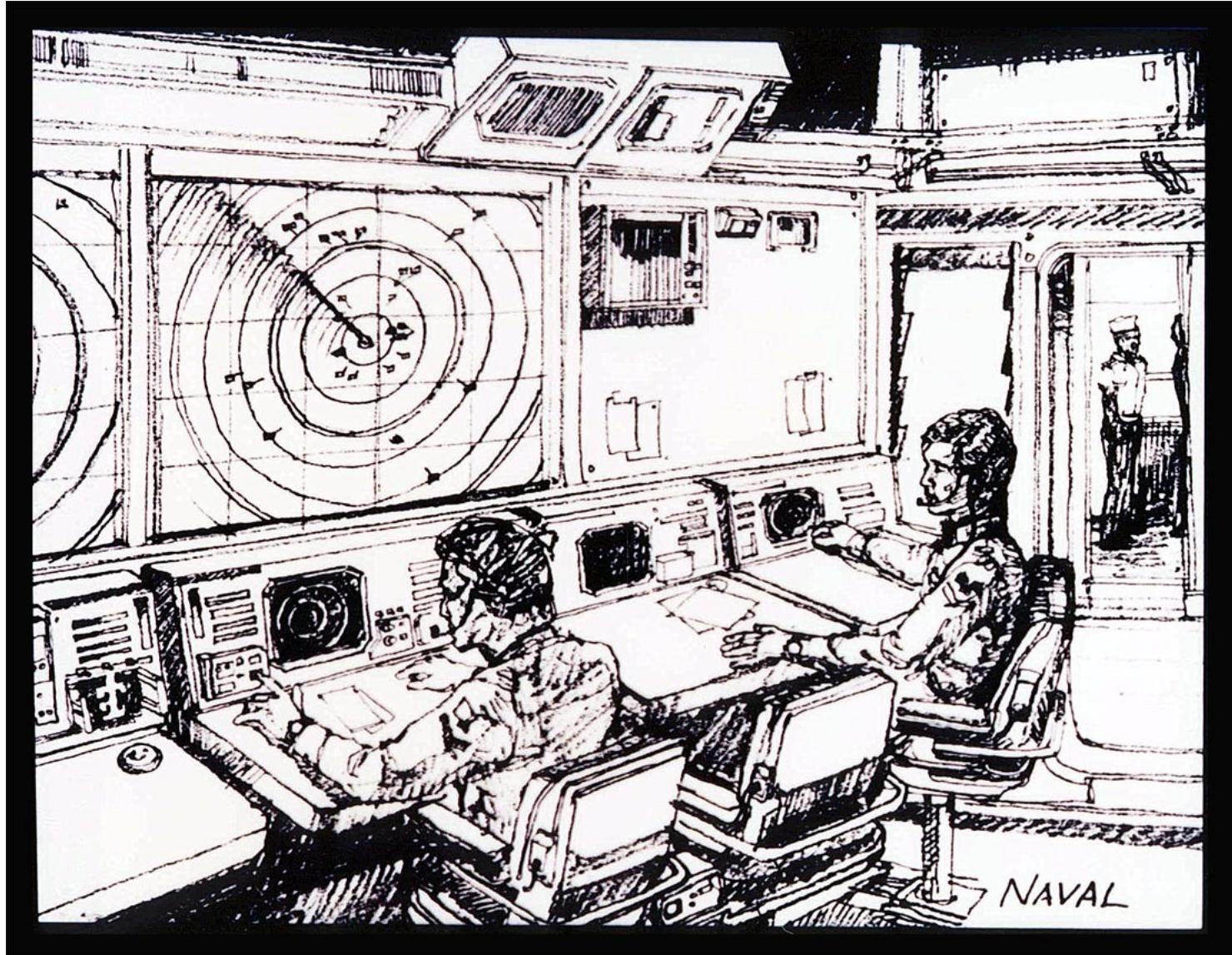
-They are a primary tool in dealing with a new world (transformation):

**Understand by experiencing**  
**Learn by doing**

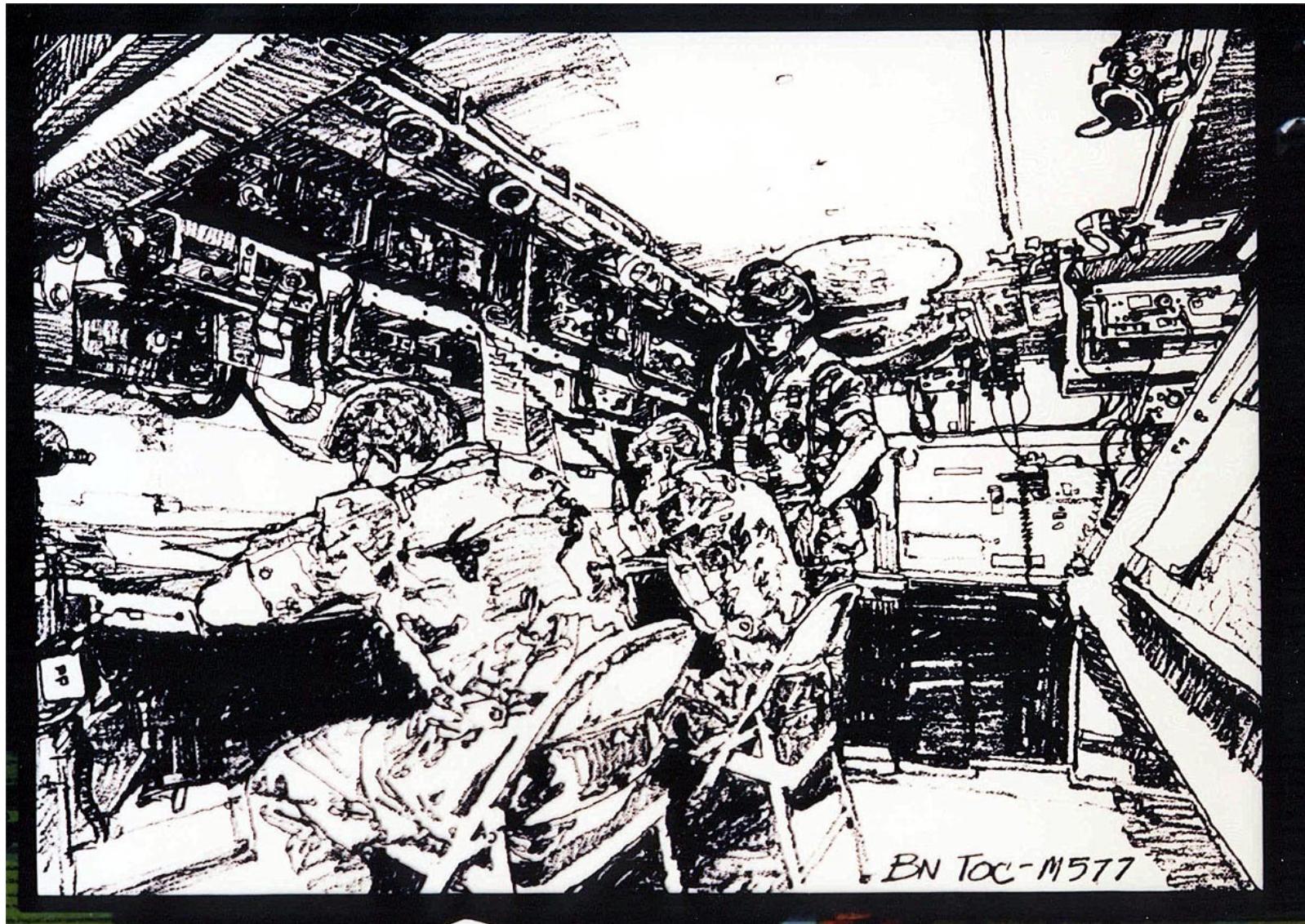
For DOD:

- If you can't game it, you can't build it **Fight the future**
- If you can't game it, you can't execute it **Fight the present**
- If you can't game it, you don't understand what just happened **Fight the past**

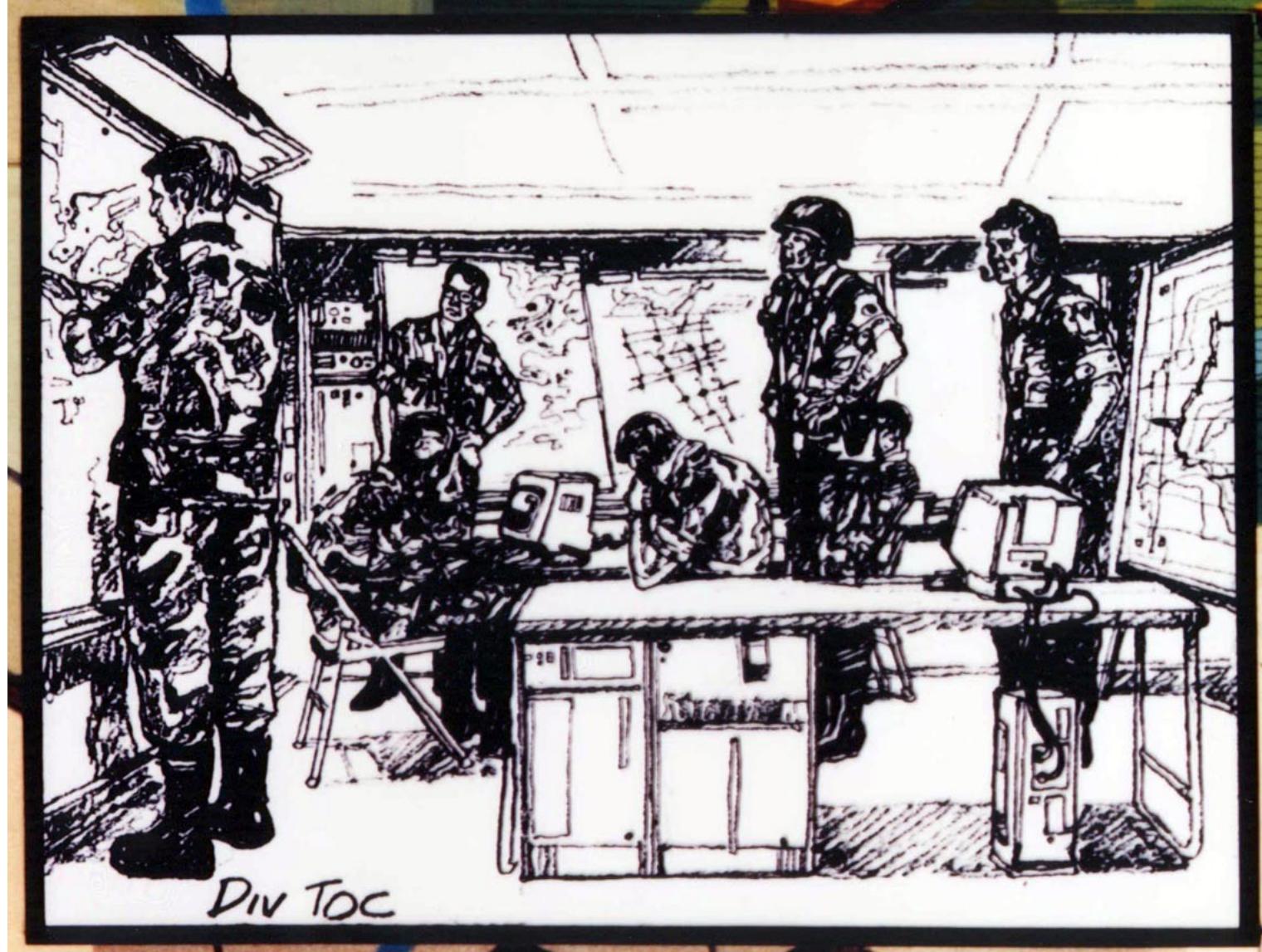
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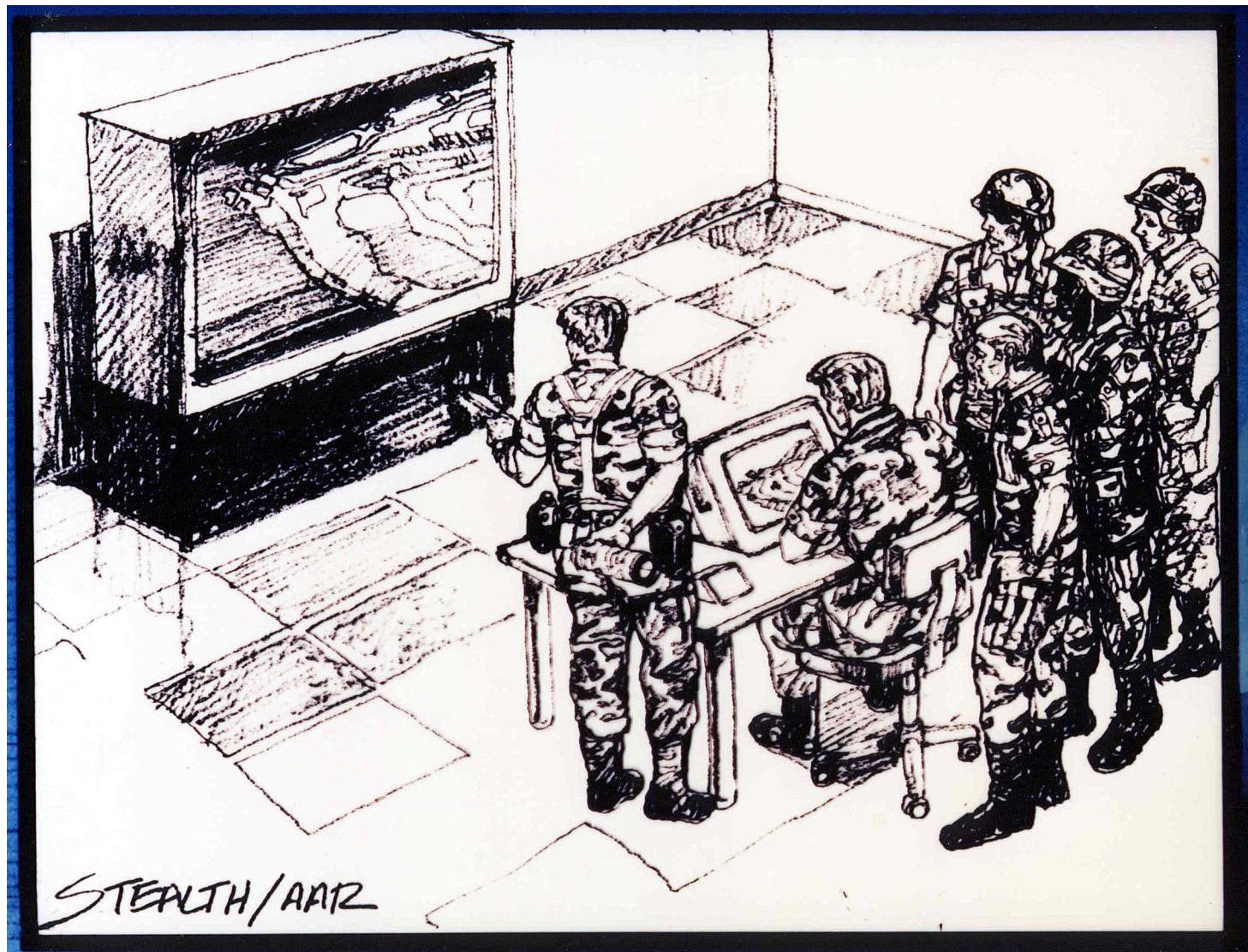
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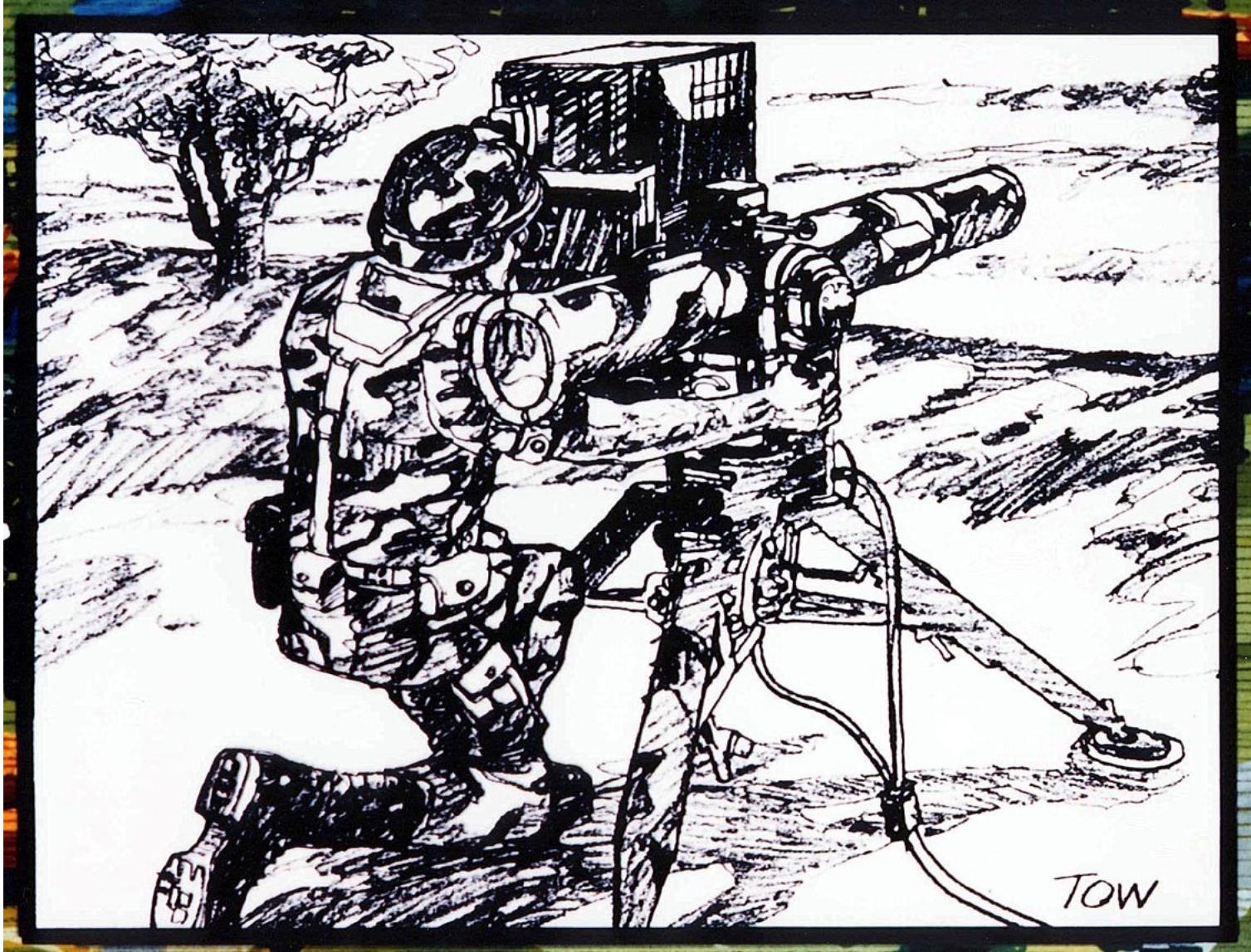
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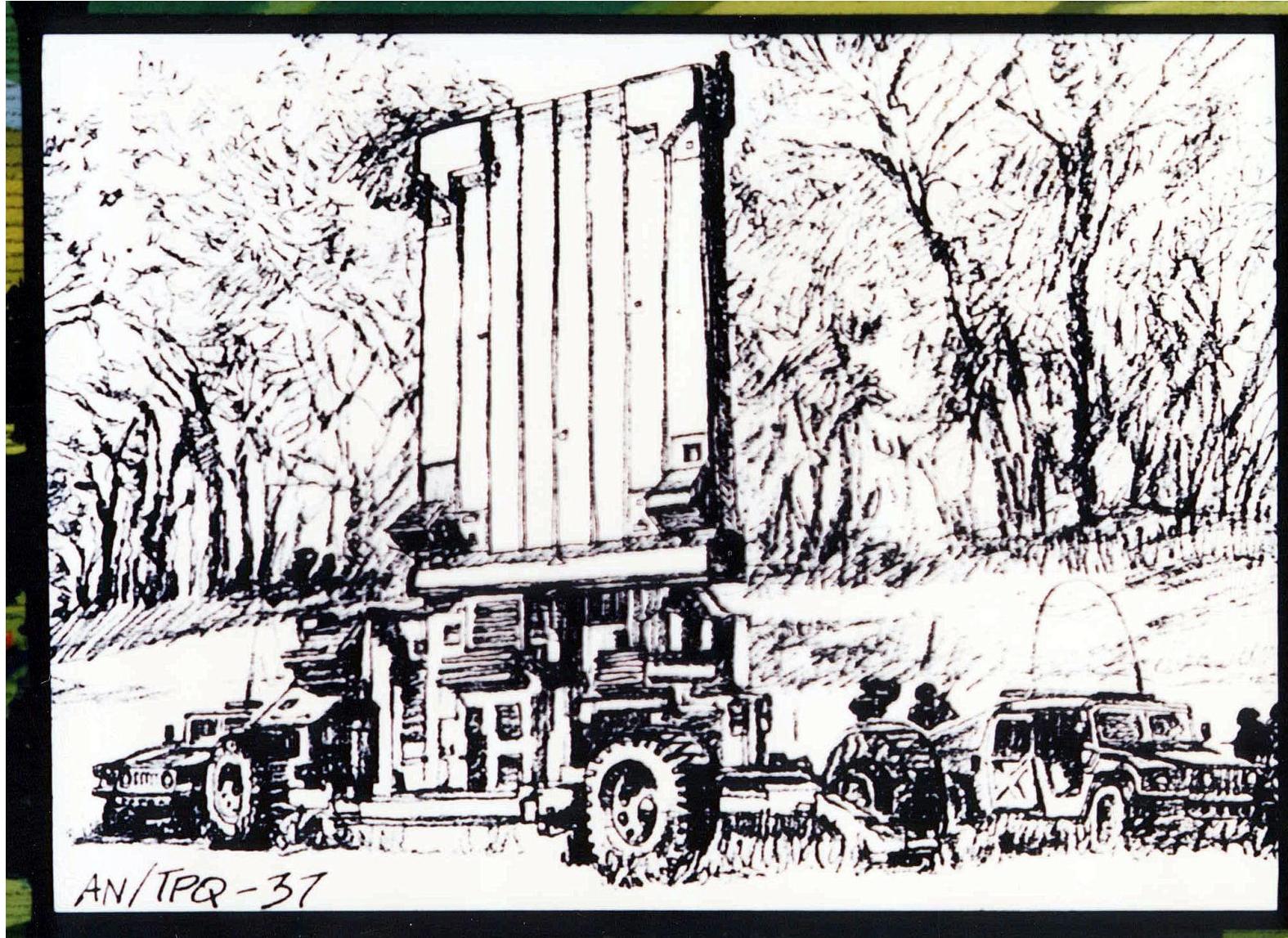
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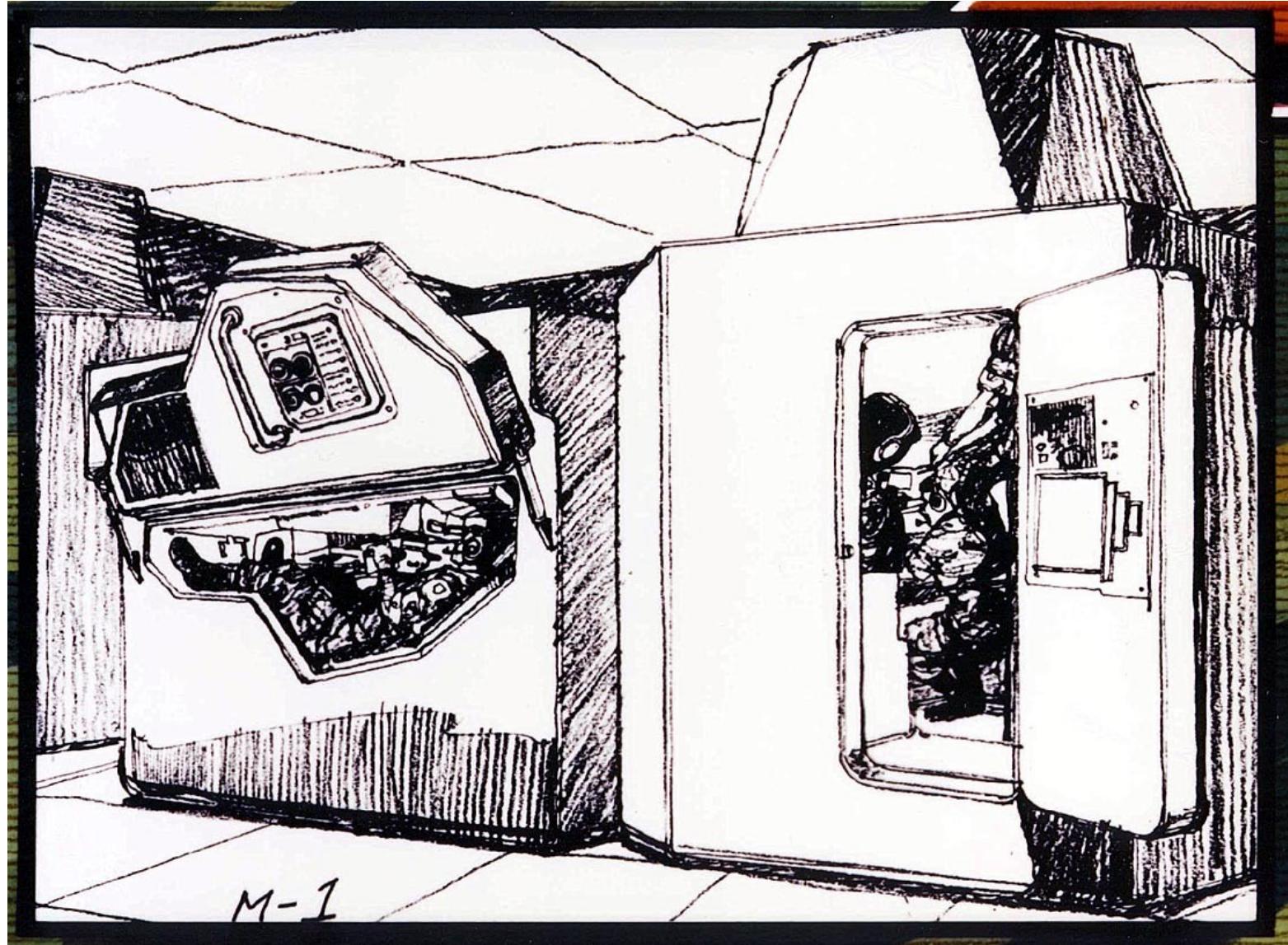
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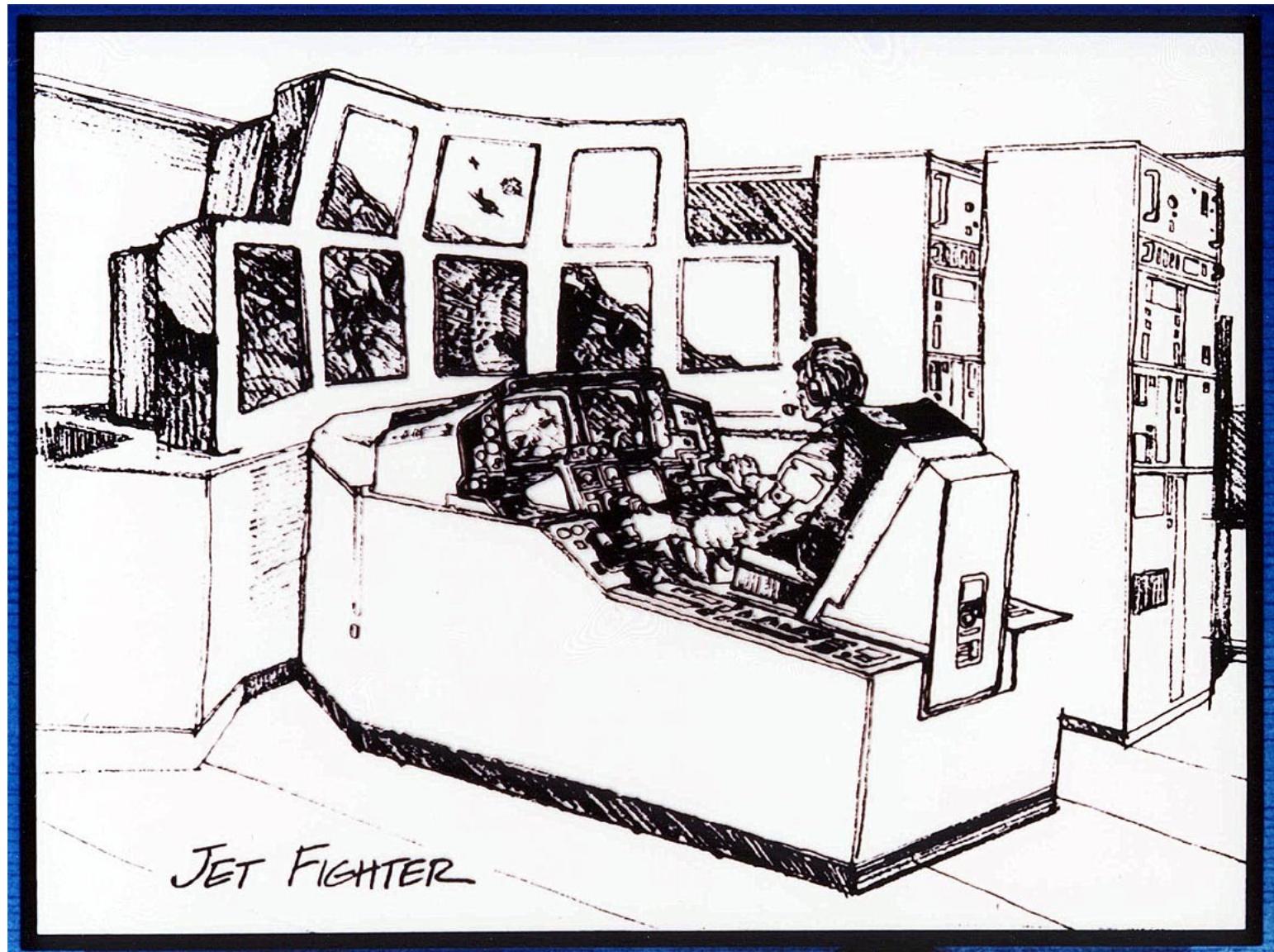


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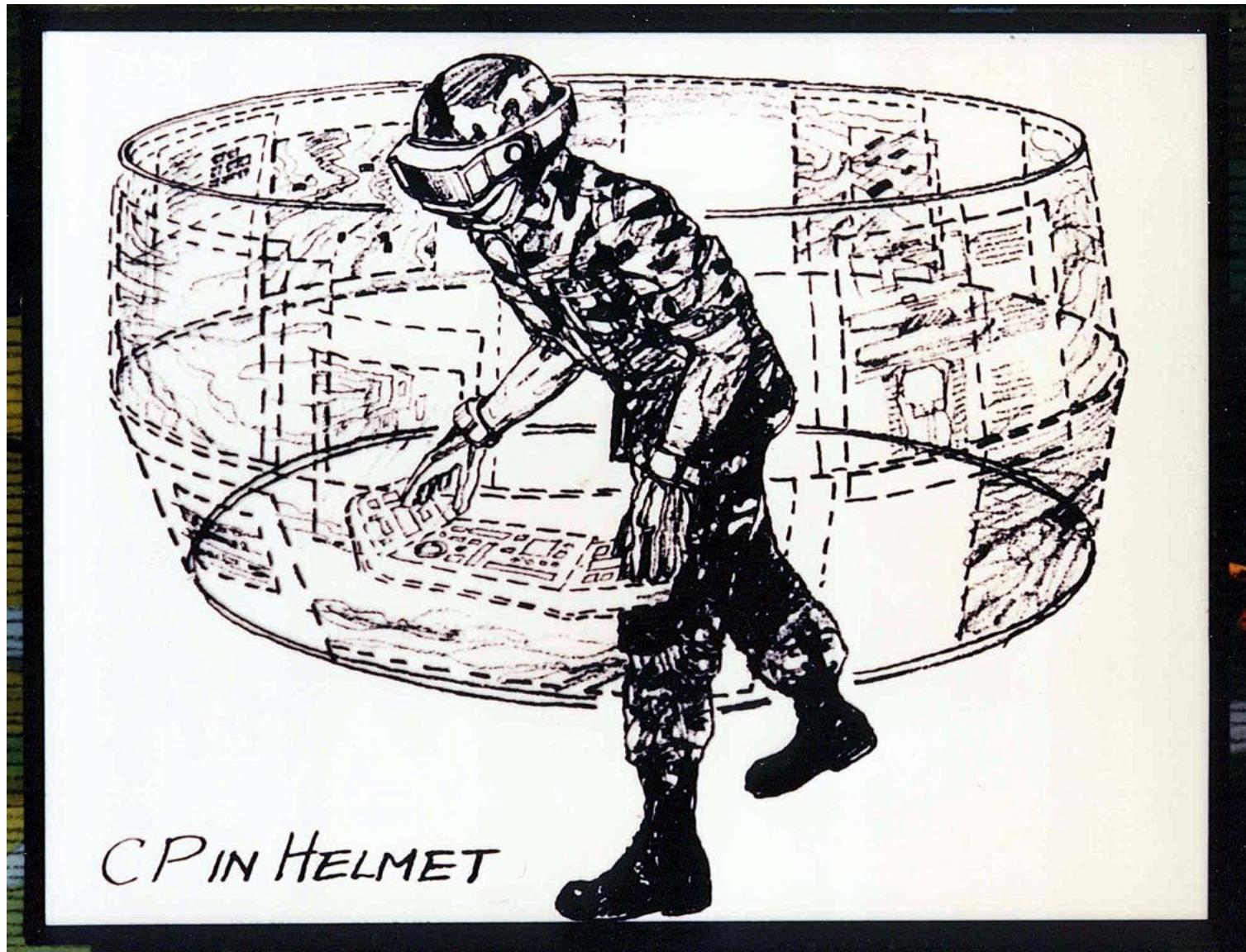


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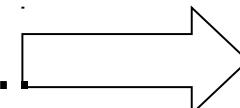


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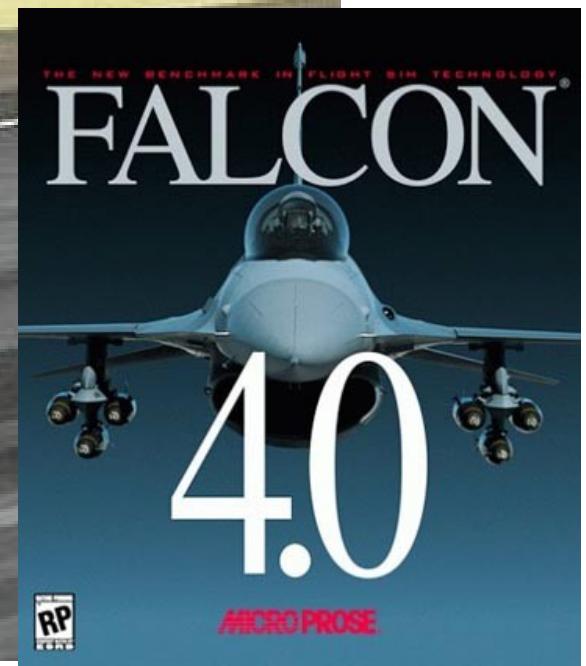


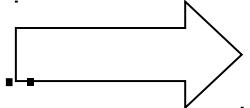


What is he flying?

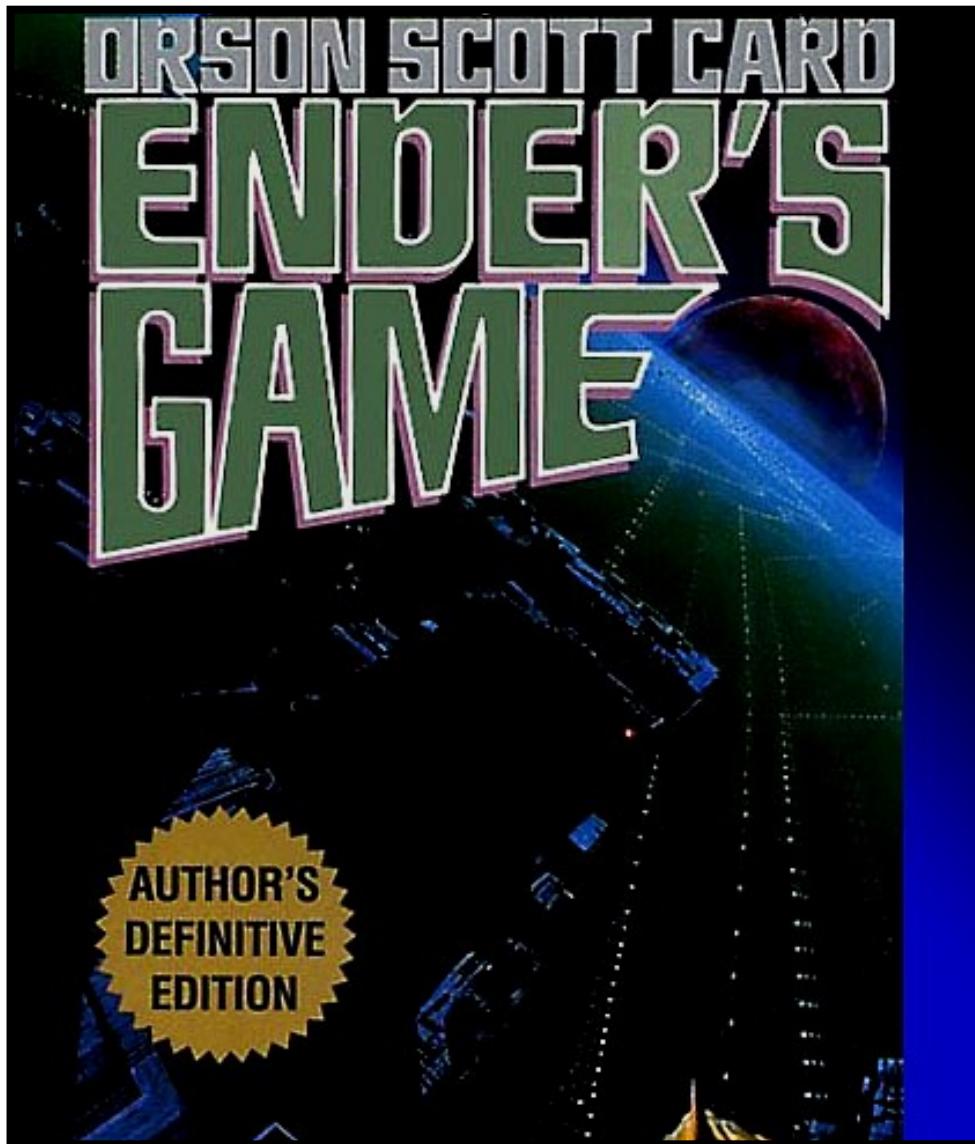
This... 

# F-16 Simulator



Or this... 





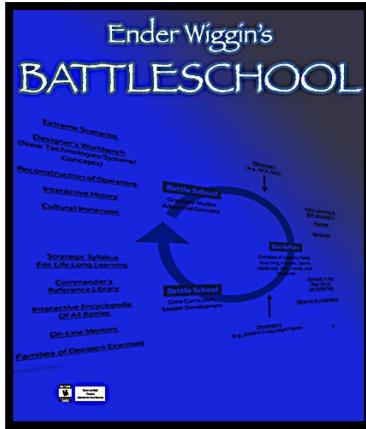
Life long  
learning to  
attain mastery

The Game is  
the Reality

# Ender Wiggin's BATTLESCHOOL



Notional "commercial games" - For research purposes only  
For official use only - Not for public distribution

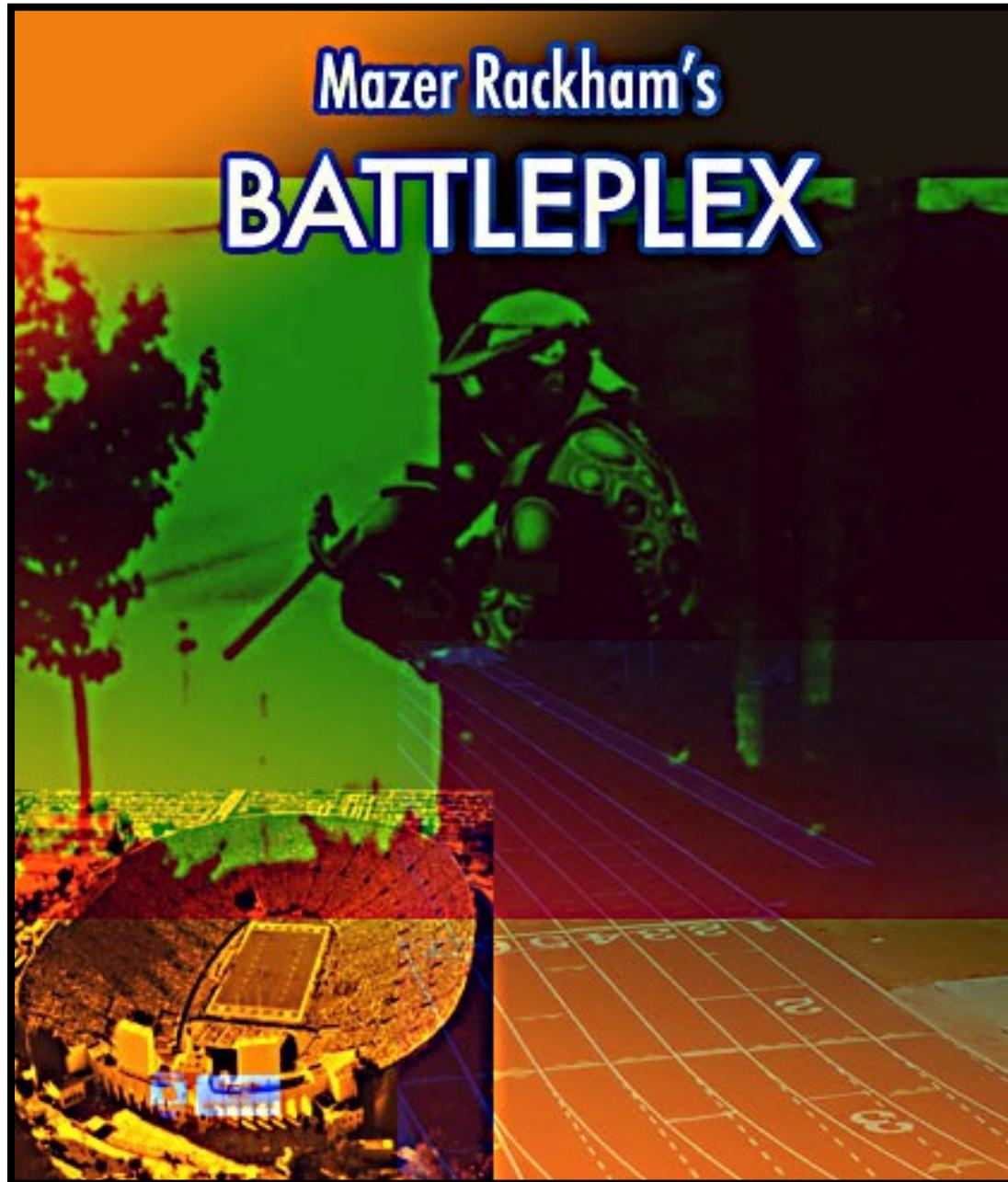


**Theme:** A life-long learning environment for combat/decision leaders

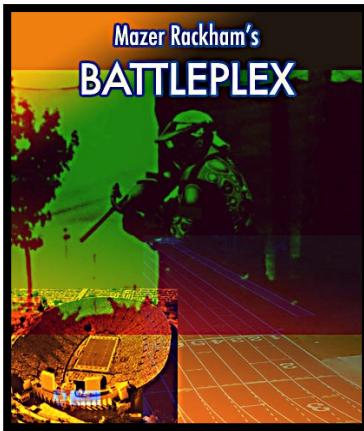
Not just professional military education:  
Redefines the approach for dealing with national interests....a new team cutting across today's agencies

### **Approach:**

- ✓ A “soup-to-nuts” approach for developing leaders
- ✓ Begins with selection, recruiting, classification (*America’s Army*-like)
- ✓ Student body is the cross section of people/organizations/talent that we need for future world activities (not limited to open combat)
- ✓ Guided by a proactive pedagogy for advanced learning
- ✓ Stimulates the emergence of “synthetic skills”



Notional "commercial games" - For research purposes only  
For official use only - Not for public distribution



**Theme:** The single place where you learn, practice, rehearse, execute, & document, in the future cyber-world. Embedded in all systems; distributed; online; persistent & pervasive. The “Matrix” for the US and allies.

### **Approach:**

- This is the sports complex for BattleSchool. It is where you prepare & execute
- It has “practice fields” for wherever we intend to go world-wide, & high fidelity “teams” that we expect to see (opponents, friendlies, neutrals, hostile-unarmed & armed)
- It has “game films” of all past battles & operations in “holodeck” form, with the ability to modify the historical record (do “what-if’s”)
- Enables introduction of new system concepts (notional developments), new CONOPs (concepts of operation), and organizational structures in past battles as well as future.
- The place to **fight the past, fight the present, fight the future**

# IRAQ 2003

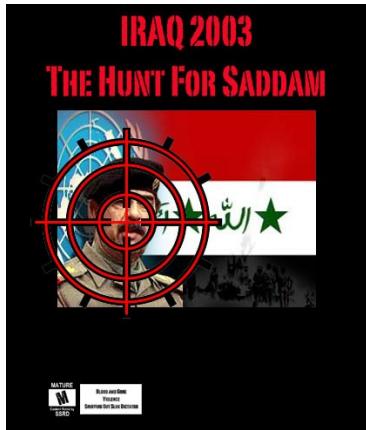
## THE HUNT FOR SADDAM



MATURE  
**M**  
Content Rated by  
SSRD

BLOOD AND GORE  
VIOLENCE  
SHOWING OUT-OF-SEGUE DICTATORSHIP

Notional "commercial games" - For research purposes only  
For official use only - Not for public distribution



**Theme:** Find an uncooperative, mobile individual in a large, dense cityscape or outlying rural areas

**Approach:**

- ◎ Players given detailed, 3D representation of the terrain & feature data for Iraq.
- ◎ Online CIA Red Team plays Saddam
- ◎ All varieties of teams allowed: From bounty hunter to massive conventional to special ops to diplomatic.
- ◎ Iraqi residents and émigrés encouraged to play (special knowledge)
- ◎ *"Help build a world-wide portfolio of options to be considered publicly & used by peace-loving governments everywhere!"*

**NIGHT RAIDS OVER BAGHDAD - YOU PICK THE TARGETS**

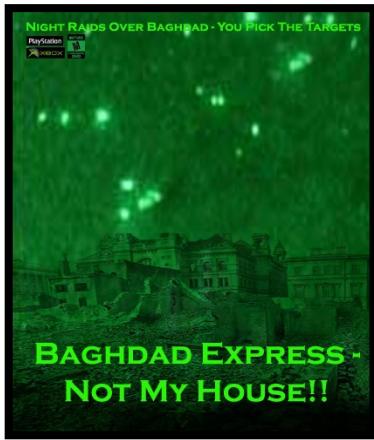
PlayStation

XBOX

Future  
Entertainment



**BAGHDAD EXPRESS -  
NOT MY HOUSE!!**



**Theme:** Targets nominated publicly online

**Approach:**

- Iraqi citizens allowed to join the target nomination and selection process. This game enlists the average Iraqi citizen to help with this targeting to make sure only genuine targets are hit
- Nominations (and rationale) are evaluated & filtered
- Baghdad is modeled in high resolution: every street, individual house, building, palace, bunker
- Because the government has hidden some of these facilities within residential areas & dual-purpose buildings, targeting is extremely difficult and requires finesse.
- After filtering by Western intelligence agencies to eliminate disinformation from Iraqi agents, the ATO (air tasking order) is generated as a game product
- Post-strike analysis from citizens refines the process

## Summary Thoughts

The convergence is happening.

It is taking root from within; emergent

New CONOPS will result with  
fundamental consequences

C C C  
O O O  
N N N  
V V V  
E E E  
R R R  
G G G  
E E E  
N N N  
C C C  
E E E

- Today's learner is different
- Sophisticated user of IT
- Plays games/models/sims
  - Expects military systems to be like games
  - Does not see a difference
  - Expects systems to be easy to understand
- Game technology is very advanced
- Games and “real systems” are converging
  - Same information infrastructure
- Are we at Ender's Game?



## Q&A



**“Relax, I’ve got it.”**